Legionellosis

(Including Legionnaires' Disease & Pontiac Fever)

DISEASE REPORTABLE WITHIN 24 HOURS OF DIAGNOSIS

Cases should be reported to the local health department where the patient resides. If patient residence is unknown, report to your own local health department. Contact information is available at: localhealth.nj.gov.

If the individual does not live in New Jersey, report the case to the New Jersey Department of Health at: (609) 826-5964.

In cases of immediately reportable diseases or other emergencies – if the local health department cannot be reached – the New Jersey Department of Health maintains an emergency after-hours phone number at: (609) 392-2020.

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Disclaimer

This document provides general guidance of the investigation of legionellosis cases and outbreaks. However, legionellosis outbreaks should be evaluated on an individual basis with the consultation of local and state public health professionals to determine the appropriate steps for prevention and control.

The content is based on available information from The Centers for Disease Control and Prevention (CDC), American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), the Centers for Medicare and Medicaid Services (CMS), and other organizations.

The materials in this toolkit were prepared and are updated as of February 2025. These organizations continue to release updated recommendations and guidance regarding *Legionella*. Please contact the New Jersey Department of Health (NJDOH) if you have questions about updated resources or guidance.

NJDOH welcomes feedback regarding this guidance (PreventLD@doh.nj.gov).

I. THE DISEASE AND ITS EPIDEMIOLOGY

The following section provides definitions for terminology commonly used in *Legionella* resources/recommendations, information on the etiology, reservoirs, modes of transmission, pathogenesis, clinical description, risk factors, incubation period, diagnosis, and treatment of disease.

ETIOLOGIC AGENT AND TRANSMISSION

Bacteria of the genus *Legionella* can cause Legionnaires' disease, Pontiac fever, or Extrapulmonary legionellosis, collectively referred to as legionellosis. There are at least 60 different known species of *Legionella*; most are considered pathogenic. *Legionella* is transmitted via inhalation of aerosolized water (mist) containing the bacteria. Less commonly, *Legionella* can be transmitted via aspiration of water (when water goes "down the wrong pipe").

CLINICAL DESCRIPTION

Legionellosis is associated with three clinically and epidemiologically distinct illnesses: Legionnaires' disease, Pontiac fever, and Extrapulmonary legionellosis. Legionnaires' disease varies in severity from mild to severe pneumonia characterized by fever, cough, and progressive respiratory distress. Legionnaires' disease can be associated with chills, myalgia, and manifestations of the gastrointestinal tract, central nervous system, and renal system. Respiratory failure and death can occur. Pontiac fever is a milder febrile illness without pneumonia and is characterized by an abrupt onset and a self-limited, influenza-like illness. Extrapulmonary legionellosis is when *Legionella* causes disease at sites outside the lungs (for example, associated with endocarditis, wound infection, joint infection).

The following table summarizes key clinical differences between Legionnaires' disease and Pontiac fever.

	Legionnaires' disease	Pontiac fever
Clinical features	Illness with pneumonia. Clinical symptoms of pneumonia may vary but include acute onset of lower respiratory illness with fever and/or cough. Additional symptoms (e.g., myalgia, shortness of breath, headache, malaise, chest discomfort, confusion, nausea, diarrhea, or abdominal pain) may be present	A milder illness, self-limited, *without* pneumonia, often a flu-like illness (fever, chills, myalgia, malaise).
Pneumonia (clinical or radiographic)	Yes	No
Pathogenesis	Replication of organism	Possibly an inflammatory response to endotoxin
Incubation period	2 to 14 days after exposure	24 to 72 hours after exposure
Treatment	Antibiotics	Supportive care (self-resolving)
Isolation of organism	Possible	Never possible
Case-fatality rate	10% (25% for healthcare-associated)	0%

INCUBATION PERIOD

The incubation period for Legionnaires' disease is from 2 to 14 days, with an average of 5 to 6 days. The incubation for Pontiac fever is from 24 to 72 hours. There is no standardized incubation period defined for Extrapulmonary legionellosis

PATHOGENESIS AND RESERVOIRS

Legionella can be found in natural, freshwater environments, such as lakes and streams, but generally are not present in sufficient quantities to cause disease. The bacteria can become a health concern when introduced into human-made water systems (e.g., plumbing system of large buildings, cooling towers, certain medical devices, decorative fountains, hot tubs) where conditions (warm, stagnant water) allow the bacteria to thrive. In this environment, *Legionella* grows and multiplies within small single-celled organisms like protozoa. In addition to providing nutrients for replicating and growing *Legionella*, protozoa also provide a shelter that protects *Legionella* from adverse environmental conditions, such as extreme temperatures and chemicals like chlorine. Once in human-made water systems, like the premise plumbing of large buildings (consisting of water heaters, storage tanks, and pipes), *Legionella* can grow within biofilm and be transmitted to susceptible hosts via aerosolization, which is the process of creating a fine mist or spray that contains the bacteria. When in human lungs, *Legionella* invades and grows within alveolar macrophages, human immune cells that look very similar to protozoa, mistaking them for their natural host and causing disease.

Where can *Legionella* grow and/or spread?

***Legionella* can grow in many parts of building water systems that are continually wet, and certain devices can then spread water droplets containing *Legionella*. Examples include:**

- Hot and cold-water storage tanks
- Water heaters
- Water-hammer arrestors
- Expansion tanks
- Water filters
- Electronic and manual faucets*
- Aerators
- Faucet flow restrictors
- Cooling towers*
- Medical devices* (such as CPAP machines, hydrotherapy equipment, bronchoscopes)
- Showerheads* and hoses
- Pipes, valves, and fittings
- Non-steam aerosol-generating humidifiers*
- Infrequently used equipment, including eyewash stations*
- Centrally-installed misters*, atomizers*, air washers*, and humidifiers*
- Ice machines*
- Hot tubs*
- Decorative fountains*

*These devices can spread *Legionella* through aerosols or aspiration

PERIOD OF COMMUNICABILITY OR INFECTIOUS PERIOD

Legionellosis is not communicable from person-to-person; however, a single episode of possible person-to-person transmission has been reported. However, water sources may continue to spread *Legionella* bacteria until corrective treatment is completed.

SUSCEPTIBILITY

People at highest risk are ≥ 50 years of age, current or former smokers, and those with chronic respiratory diseases (such as emphysema or COPD), immune system disorders due to disease or medication (such as corticosteroid use, cancer, transplants), systemic malignancy, and underlying illness such as diabetes, renal failure, hepatic failure. Prior infection does not necessarily prevent re-infection.

INDICATIONS FOR LEGIONNAIRES' DISEASE TESTING

Listed below are indications that warrant testing patients with pneumonia for Legionnaires' disease:

- Patients who have failed outpatient antibiotic treatment for community-acquired pneumonia
- Patients with severe pneumonia, in particular those requiring intensive care
- Immunocompromised patients with pneumonia
- Patients with a travel history (patients who have traveled away from their home overnight within 14 days before symptom onset)
- Hospitalized patients with healthcare-associated pneumonia (pneumonia with onset ≥48 hours after admission) at risk for Legionnaires' disease
- Patients with an overnight stay in a healthcare facility within 14 days before symptom onset
- Patients with an epidemiologic link to a setting with a confirmed source of Legionella or that has been associated with at least one laboratory-confirmed case of Legionnaires' disease

Testing for healthcare-associated Legionnaires' disease is especially important if any of the following are identified in a healthcare facility:

- Other patients with healthcare-associated Legionnaires' disease diagnosed in the past 12 months
- Positive environmental tests for Legionella
- Current changes in water quality that may lead to Legionella growth (such as low chlorine levels or nearby construction)

DIAGNOSIS

The preferred diagnostic tests for Legionnaires' disease are culture of lower respiratory secretions (e.g., sputum, bronchoalveolar lavage) on selective media and the *Legionella* urinary antigen test. Serological assays can be nonspecific and are not recommended in most situations. Best practice is to obtain both sputum culture and a urinary antigen test concurrently. Sputum should ideally be obtained prior to antibiotic administration, but antibiotic treatment should not be delayed for this reason. *Legionella* culture needs to be specified if Legionnaires' disease is being considered; it is not part of the testing when a routine respiratory culture is ordered. The urinary antigen test can detect *Legionella* infections in some cases for days to weeks after treatment. The urinary antigen test only detects *Legionella pneumophila* serogroup 1. Isolation of *Legionella* by culture is important for detection of other species and serogroups and for public health investigations. Molecular techniques can be used to compare clinical isolates to environmental isolates and confirm the outbreak source. As a supplement to culture, PCR of lower respiratory specimens can also detect other *Legionella* species and serogroups, can be performed in far less time by most laboratorians, and does not require specialized reagents. For more information regarding diagnostic tests, please visit the CDC's website at: https://www.cdc.gov/legionella/php/laboratories/index.html

Laboratories sometimes reject lower respiratory specimens during a "work-up" for pneumonia based on specimen quality (e.g., due to lack of white blood cells in the sample, contamination with other bacteria). However, laboratories should not reject lower respiratory specimens due to lack of white blood cells or presence of contaminating bacteria when working-up Legionnaires' disease because *Legionella* can still be recovered.

TREATMENT

If the patient has Legionnaires' disease, see the most recent guidelines for treatment of community-acquired pneumonia (http://bit.ly/CommunityPneumonia) and hospital-acquired pneumonia (http://bit.ly/HospitalPneumonia). Macrolides (e.g., azithromycin) and respiratory fluoroquinolones (e.g., levofloxacin) are currently the preferred agents for treating Legionnaires' disease.

II. SURVEILLANCE AND CASE INVESTIGATIONS

Strong surveillance helps to quickly identify new cases, epidemiological links between cases, and the need for outbreak investigations. Outbreak investigations are critical for detecting sources of transmission and implementing control measures.

The following section includes the case definition for legionellosis, tools to conduct a case investigation, and information for how to manage special situations.

REPORTING

Health care providers and administrators are required to report cases of legionellosis (Legionnaires' disease, Pontiac fever, extrapulmonary *Legionella* infections) to the local health department where the patient resides within 24 hours of diagnosis (N.J.A.C. 8:57 – 1.4). If the patient residence is unknown, report to your own local health department. Contact information is available at: localhealth.nj.gov.

When possible, include the following data elements in the initial report:

- **Clinical**: Symptoms consistent with Legionnaires' disease (pneumonia), Pontiac fever, or extrapulmonary disease.
- **Exposures:** Travel history, healthcare exposures, use of respiratory equipment, and any other water exposures (e.g., hot tubs, decorative fountains) in 14 days prior to illness onset. Include location and dates of exposures.

CASE DEFINITION FOR CASE CLASSIFICATION

The following are descriptions of **clinical and laboratory** criteria needed to determine how a case of legionellosis should be classified (e.g., confirmed, suspected). A clinically compatible case of legionellosis must have supporting laboratory evidence to classify the case as confirmed or suspected.

Clinical Description

Legionellosis is associated with three clinically and epidemiologically distinct illnesses: Legionnaires' disease, Pontiac fever, or extrapulmonary legionellosis.

- **Legionnaires' disease:** presents as pneumonia, diagnosed clinically and/or radiographically. Evidence of clinically compatible disease can be determined several ways: a) a clinical or radiographic diagnosis of pneumonia in the medical record or b) if "pneumonia" is not recorded explicitly, a description of clinical symptoms that are consistent with a diagnosis of pneumonia. Clinical symptoms of pneumonia may vary but must include acute onset of lower respiratory illness with fever and/or cough. Additional symptoms could include myalgia, shortness of breath, headache, malaise, chest discomfort, confusion, nausea, diarrhea, or abdominal pain.

- **Pontiac fever:** a milder, influenza-like illness. While symptoms could sound similar to those described for Legionnaires' disease, there are distinguishing clinical features. Pontiac fever does not present as pneumonia. It is less severe than Legionnaires' disease, rarely requiring hospitalization. Pontiac fever is self-limited, meaning it resolves without antibiotic treatment.

- **Extrapulmonary legionellosis:** *Legionella* can cause disease at sites outside the lungs (for example, associated with endocarditis, wound infection, joint infection, graft infection). A diagnosis of extrapulmonary legionellosis is made when there is clinical evidence of disease at an extrapulmonary site and diagnostic testing reveals evidence of *Legionella* at that site.

Laboratory Criteria for Diagnosis:

Confirmed:	▪ By culture: isolation of any *Legionella* organism from respiratory secretions, lung tissue, pleural fluid, or other normally sterile fluid. ▪ By antigen: detection of *Legionella pneumophila* serogroup 1 antigen in urine using validated reagents. ▪ By seroconversion: fourfold or greater rise in specific serum antibody titer to *Legionella pneumophila* serogroup 1 using validated reagents. ▪ By PCR: detection of any *Legionella* species from lower respiratory secretions, lung tissue, pleural fluid, or extrapulmonary site by a validated nucleic acid amplification test.
Suspected:	▪ By seroconversion: fourfold or greater rise in antibody titer to specific species or serogroups of *Legionella* other than *L. pneumophila* serogroup 1 (e.g., *L. micdadei, L. pneumophila* serogroup 6). ▪ By seroconversion: fourfold or greater rise in antibody titer to multiple species of *Legionella* using pooled antigen and validated reagents. ▪ By the detection of specific *Legionella* antigen or staining of the organism in respiratory secretions, lung tissue, or pleural fluid by direct fluorescent antibody (DFA) staining, Immunohistochemistry (IHC), or other similar method, using validated reagents.

Case Classification

- **Confirmed**: A clinically compatible case with confirmatory laboratory evidence for *Legionella*.
- **Suspect**: A clinically compatible case with supportive laboratory evidence for *Legionella*.

*****For NJDOH use only*****

In an outbreak setting, NJDOH may consider a clinically compatible case with an epidemiologic link* during the 14 days before onset of symptoms to be a "probable case".

***Epidemiologic Linkage Criteria for a Probable Case**

- Epidemiologic link to a setting with a confirmed source of *Legionella* (e.g., positive environmental sampling result associated with a cruise ship, public accommodation, cooling tower, etc.).
  OR
- Epidemiologic link to a setting with a suspected source of *Legionella* that is associated with at least one confirmed case.

SURVEILLANCE CLASSIFICATIONS

The New Jersey Department of Health further classifies suspected and confirmed cases of legionellosis based on exposures they may have had during their incubation period. These exposures are based on setting and are described below.

Exposure Categories for Surveillance Purposes

- **Travel[1]:** The patient spent at least one night away from home (in the state of residence, another state, or another country) in the 14 days before date of symptom onset, not including nights spent in a healthcare facility.
- **Presumptive healthcare[2]:** A case with ≥10 days of continuous stay at a healthcare facility during the 14 days before onset of symptoms.
- **Possible healthcare[2]:** A case that spent a portion of the 14 days before date of symptom onset in one or more healthcare facilities but does not meet the criteria for presumptive healthcare-associated Legionnaires' disease.
- **Assisted living:** The patient spent a portion of the 14 days before date of symptom onset in a facility that provides custodial care without skilled nursing (e.g., assistance with activities of daily living, like bathing and dressing).
- **Senior living:** The patient spent a portion of the 14 days before date of symptom onset in a facility that provides independent living for the elderly.

1. Examples of travel may include hotels/resorts, vacation/home rentals, campgrounds, RV parks, river and ocean cruises, truck stops, and homes of family and friends. Additionally, patients may stay overnight at congregate living facilities, such as shelters or correctional facilities. Although NJDOH does not consider this type of setting to be travel-associated according to the surveillance definition, it is still important to systematically capture these settings as part of the patient's exposure history.

2. For legionellosis surveillance, the New Jersey Department of Health defines a healthcare facility as a hospital (acute-care, long-term acute care, critical access, children's, psychiatric), long-term care facility (skilled nursing, nursing home, inpatient hospice, rehabilitation, psychiatric residential treatment), or clinic (outpatient clinics including general and specialty, ambulatory surgery centers, outpatient rehabilitation, dialysis, dental).

CASE INVESTIGATIONS

Conducting a Legionellosis Case Investigation

Case investigation is undertaken by the LHD where the case-patient resides. NJDOH recommends the following investigation steps at the LHD level.

1. **Enter the case into NJDOH's Communicable Disease Reporting and Surveillance System (CDRSS) within 24 hours of notification** if not already entered by the provider or the laboratory. Instructions for creating a case in CDRSS can be found here.

2. **Confirm the laboratory results meet the laboratory criteria (confirmatory or supportive) of the legionellosis case definition.**

Test	Specimen Type(s)	Laboratory Evidence	Notes
Urinary antigen	Urine	Confirmatory	• Rapid (same day) • Can only detect *L. pneumophila* serogroup 1 • Used to diagnose Legionnaires' disease and Pontiac fever
Culture	• Lower respiratory secretions (e.g., sputum) • Lung tissue • Pleural fluid • Extrapulmonary site	Confirmatory	• Detects all species and serogroups • Slow (>5 days to grow) • Affected by some antibiotics • Requires specialized media • Sensitivity highly dependent on technical skill
PCR	• Lower respiratory secretions • Lung tissue • Pleural fluid • Extrapulmonary site	Confirmatory	• Rapid • Possible to detect species and serogroups other than Lp1
DFA	• Lower respiratory secretions • Lung tissue • Pleural fluid • Extrapulmonary site	Supportive	• Technically difficult • Reagents difficult to obtain • Not commonly used
Serology	Serum	Confirmatory for Lp1; supportive for other types of *Legionella*	Must have paired sera collected at acute onset to 2 weeks after symptoms and 3 to 6 weeks later

3. **Verify the clinical information meets the clinical criteria of the legionellosis case definition**. It is recommended to contact the treating facility's Infection Preventionist (IP) to obtain this information, and other relevant details.
    a. Determine the patient's clinical presentation, including what **signs and symptoms** the patient presented with (e.g., refer to listed signs and symptoms within CDRSS), and if possible, the illness onset date of each.
        i. Specifically ask about <u>acute</u> onset of fever and respiratory symptoms such as cough, shortness of breath, difficulty breathing, chest pain, etc. If the patient has baseline or chronic respiratory symptoms, ask about when those symptoms worsened. This information is often found on the patient's H&P or admitting notes. The medical notes often will explicitly say if the symptom was present or absent.
        ii. Determine if the patient was **diagnosed with pneumonia**. If yes, verify if it was confirmed radiographically by chest x-ray or CT scan. If pneumonia was diagnosed ≥ 48 hours after admission, request all prior chest radiographs to identify the earliest abnormal finding.
    b. Review the reported signs and symptoms to determine if the patient's clinical presentation matches the **clinical criteria** for either Legionnaires' disease, Pontiac fever, or extrapulmonary legionellosis:
        i. <u>Legionnaires' disease</u>: Presents as **pneumonia**, diagnosed clinically and/or radiographically.
            1. If "pneumonia" is not recorded explicitly, a description of clinical symptoms that are consistent with a diagnosis of pneumonia. Clinical symptoms of pneumonia may vary but must include **acute onset of lower respiratory illness with fever and/or cough**. Additional symptoms could include myalgia, shortness of breath, headache, malaise, chest discomfort, confusion, nausea, diarrhea, or abdominal pain.
        ii. <u>Pontiac fever</u>: Clinical symptoms may vary but must include acute symptom onset of **one or more** of the following: **fever, chills, myalgia, malaise, headaches, fatigue, nausea and/or vomiting.**
        iii. <u>Extrapulmonary legionellosis</u>: A diagnosis of extrapulmonary legionellosis is made when there is clinical evidence of disease at an extrapulmonary site (outside of the lungs) and diagnostic testing indicates evidence of *Legionella* at that site. Please note that this is a rare occurrence.

c. During this call with the IP, it is helpful to obtain the following relevant details for the case investigation:

   i. Determine that **date the patient first presented to the hospital**. Sometimes the date they first arrived at the Emergency Department until they are admitted are different dates.

   ii. Determine if the patient was **treated in emergency department only or admitted**, including date of ED visit and/or admission.

   iii. Determine **discharge date and clinical outcome** (survived, recovering, deceased). If the patient is still hospitalized, check back with hospital until discharge (as resources allow).

   iv. Determine the patient's **underlying health conditions** (e.g., current or former smoker, immunocompromised, renal or liver disease, respiratory conditions such as COPD, etc.).

   v. Determine if any **potential water exposures** were documented (e.g., patient just returned from traveling).

4. **Request that clinical specimens are obtained, when possible,**

   a. For patients who had a positive *Legionella* UAT, request that the facility **collects a lower respiratory specimen** from the patient (if one is not already available). The specimen should be refrigerated (2-8°C) after collection and frozen (-20°C or lower) as soon as possible within 96 hours. Request to be notified whether they can obtain the specimen.

   b. Contact NJDOH immediately if a pure culture isolate is available. These isolates should be stored at room temperature or refrigerated.

   c. Instructions for submitting clinical specimens for *Legionella* testing can be located on NJDOH's Legionellosis Webpage.

5. **Contact the case-patient (or surrogate) to complete the interview process.**

   a. If the patient is initially unable to communicate for the interview due to severity of illness, conduct the initial interview with the patient's surrogate and interview the patient when the patient can communicate.

   b. Verify the patient's **demographics** (e.g., DOB, address, sex, ethnicity, race).

   c. Determine the patient's **illness onset date based on when signs and symptoms** first occurred. This may be difficult for patients with complex medical histories or those with atypical symptoms. If the patient had existing respiratory symptoms at baseline (e.g., chronic cough), use the date when

symptoms got worse. When the onset date is uncertain, consult the following sources:

i. Diagnosing healthcare provider or hospital infection preventionist.

ii. Medical summaries and progress reports, history and physical (initial clinical evaluation), consultations, radiology reports, and medication records (specifically antibiotics) for all medical facilities visited in the 2-4 weeks prior to suspected symptom onset. You may wish to use CDC's Legionnaires' Disease Medical Record Abstraction Template.

d. Determine **potential exposures to aerosolized water** the patient may have had in the 14 days prior to illness onset. Ensure you complete all the questions listed under the CDRSS Section "Legionellosis Risk Factors" (e.g., travel, healthcare, hot tubs, etc.).

e. Determine the patient's **occupation and workplace address**. Document this information under the Industry and Occupation Information section within CDRSS.

i. Ask if the patient was exposed to **aerosolized water during work** (e.g., services cooling towers, hot tubs, decorative fountains, water parks, works in industrial plants with water spray systems, drives commercial trucks and frequents truck stops).

f. If at least three, unsuccessful attempts were made to contact the case-patient or surrogate, please complete the case in CDRSS with available information, including clinical information obtained from the infection preventionist/healthcare provider, and indicate the reason for missing information (e.g., lost to follow-up). Consider sending a certified letter to the patient requesting a call-back to complete the interview.

6. **Determine the case status and update CDRSS accordingly.** You cannot classify a case based solely on laboratory information.

a. Confirmed: if the case meets the confirmatory laboratory criteria AND clinical criteria.

b. Not a Case: If the case doesn't meet the confirmed or suspected clinical AND laboratory criteria. Provide detailed reasoning in CDRSS.

c. Out of State: If the patient resides outside of New Jersey.

d. Probable: Reserved for NJDOH use only. **Do not select.**

e. Possible: Not an acceptable case status for legionellosis cases. **Do not select.**

7. **Classify the case as "LHD closed" once the investigation is complete. Ensure that all information is entered into CDRSS. NJDOH no longer requests the CDC Legionellosis Case Report Form to also be completed.**

8. **Inform relevant parties of high-risk exposures.**

    a. If reported exposures occurred outside of your jurisdiction, notify NJDOH, by email, within 1 business day of when a case-patient reports exposure to a hot tub or travel, healthcare, assisted living, senior living, correctional, or fitness/spa facility.

    b. If reported exposures occurred within your jurisdiction, verify with NJDOH to determine if there are additional cases outside of your jurisdiction linked to the same facility or any prior investigations related to it.

        i. If the individual is a resident of a long-term facility, then refer to "Additional Considerations: Long-Term Care Facility Exposure Guidance" for additional information that should be collected as part of the case investigation.
        ii. If a case-patient reports visiting a high-risk setting (such as a hotel, healthcare facility, or congregate living) and no additional legionellosis cases are associated with the facility, and the situation doesn't meet outbreak criteria, then notification is sufficient. This informs the facility of the single case and encourages them to review their water management practices. For more details and template letters, see "Managing Special Situations of Single Cases."

Additional Considerations: Long-Term Care Facility Exposure Guidance

To ensure a thorough investigation when a reported case of Legionnaires' disease is possibly linked to a long-term care facility (LTCF), follow these steps beyond routine procedures for the general population:

1. **Contact the LTCF directly if within your jurisdiction; otherwise, notify NJDOH.**
2. **Complete the following supplemental questions for each LTCF visited by the patient within 14 days prior to illness onset. Until a CDRSS Disease Specific Questionnaire (DSQ) is developed, enter this information into the comments section of CDRSS. Notify NJDOH once data is obtained.**
    a. Date admitted to LTCF and previous location (e.g., home, hospital, another LTCF).
    b. Date discharged/transferred and destination (e.g., home, hospital, another LTCF).
    c. Reason for hospitalization and/or in-house *Legionella* testing (if applicable).
    d. Documented signs and symptoms of Legionnaires' disease during LTCF stay; request supporting documentation if available.
    e. Documented underlying health conditions including respiratory conditions (e.g., COPD, emphysema) and history of pneumonia.
    f. Respiratory therapy received in the 14 days prior to becoming ill, including:
        i. Nebulizers: Devices used to administer medication in the form of a mist that patients inhale. They often require water for operation or cleaning.
        ii. Humidifiers: Used to add moisture to the air breathed in by patients. Some types of humidifiers utilize water to create the humidified air.
        iii. CPAP/BiPAP Machines: Continuous Positive Airway Pressure (CPAP) and Bilevel Positive Airway Pressure (BiPAP) machines often have humidifiers integrated to prevent dryness in the airway. These humidifiers use water.
        iv. Ventilators: Some ventilators incorporate humidification systems to moisten the air being delivered to patients.
        v. Cough Assist Machines: Used to help patients clear their lungs of mucus, these machines may use water or require water for operation.
        vi. Oxygen Concentrators: Although they primarily concentrate oxygen from the air, some models have humidification capabilities that involve water.

g. Other healthcare/clinical care services received in the 14 days prior to becoming ill, such as dialysis, hydrotherapy, and dental care.

h. Medical procedures undergone in the 14 days prior to becoming ill, such as surgeries and bronchoscopies.

i. Presence of endotracheal, tracheostomy, and/or enteral devices.

j. Details of any outings from the LTCF in the 14 days before illness onset, including purpose, date, and duration.

k. Room numbers, units, and clinical care areas occupied or visited by the patient in the 14 days before illness onset.

l. Patient's bathing regimen. Include frequency of bathing and if there is use of showers or tubs at the facility, including room numbers.

m. Availability of open windows in patient-occupied rooms.

n. Visits to the facility’s beauty salon within 14 days prior to illness onset.

o. Any other water exposures within the facility in the 14 days prior to illness onset.

p. Risk assessment for aspiration.

q. Special diet requirements (e.g., dysphagia mechanical soft diet).

r. Patient's mobility status (ambulatory or bed-bound).

Commonly Asked Questions

How to differentiate between Legionellosis, Legionnaires' disease, and Pontiac fever, and extrapulmonary legionellosis?

Legionellosis is a catch-all term for all types of clinical *Legionella* infections. Legionnaires' disease, Pontiac fever, and extrapulmonary legionellosis are different manifestations of legionellosis. Legionnaires' disease presents as a type of pneumonia. Patients often require antibiotic treatment in a hospital. Pontiac fever is a milder form of legionellosis. It is distinguished from Legionnaires' disease by its absence of pneumonia presentation, lower severity, and self-limiting nature. Patients often recover at home without antibiotics. Extrapulmonary legionellosis is when *Legionella* causes disease at body sites outside of the lungs (for example, endocarditis, wound infection, joint infection, graft infection).

What are the symptoms of Legionnaires' disease?

The clinical feature of Legionnaires' disease is the presentation of pneumonia. Clinical symptoms may vary but include acute onset of lower respiratory illness. Symptoms may include fever, cough, shortness of breath, chest discomfort/pain, headache, muscle aches, confusion, nausea, diarrhea, and/or abdominal pain.

What are the symptoms of Pontiac fever?

Fever, chills, headache, fatigue, and/or muscle aches. Symptoms usually last less than 1 week.

What are the symptoms of extrapulmonary legionellosis?

Symptoms of extrapulmonary legionellosis will depend on the infection site.

How do I determine the illness onset date?

Identify the date when symptoms compatible with legionellosis first appeared. In cases where baseline respiratory symptoms exist (e.g., chronic cough), use the date when symptoms worsened. Atypical presentations, such as altered mental status, falls, or mistaken diagnoses like congestive heart failure, may occur.

When investigating a case of Legionnaires' disease what should I do if "pneumonia" is not explicitly documented in the medical records?

When "pneumonia" is not explicitly documented, then verify if the patient presented with clinical symptoms consistent with pneumonia, which would be an acute onset of lower respiratory illness with fever and/or cough.

Do routine respiratory panels include *Legionella*?

No, routine respiratory panels typically do not include *Legionella.* Specialized tests are required that are designed to specifically detect *Legionella*.

A positive *Legionella* PCR result from a nasopharyngeal swab was reported. Does this meet the laboratory criteria of the case definition?

No, it does not. If there are no other positive *Legionella* laboratory results associated with this patient, then it can be closed as “Not a Case”.

A single *Legionella* antibody titer >1:256 was reported. Does this meet the laboratory criteria of the case definition?

No, a single titer >1:256 does not confirm the case unless there’s a significant (fourfold) rise in titers over time (collected 3-6 weeks apart). Serum testing for titers is generally not recommended.

What is the difference between a chest x-ray and CT scan?

Chest x-rays are standard for pneumonia evaluation, while CT scans provide more detailed imaging but are less commonly used due to time and costs. Sometimes a patient will have a normal CXR but then a subsequent abnormal CT scan.

What if I can’t contact the patient to conduct the interview?

Contact the hospital to determine if the patient has been discharged yet. If the patient is too ill or has expired, interview a proxy instead. The hospital should be able to provide contact information for an emergency contact or next of kin. If the patient has been discharged, determine if they were discharged home or to another healthcare facility. If the patient is home, consider alternative ways to contact them if they aren’t answering the phone. For example, send a letter by certified mail, leave a door hanger, and/or send a text message requesting a call back.

How do I distinguish a new case of legionellosis if the patient was previously diagnosed?

An individual should be considered a new case if their previous illness was followed by a period of recovery prior to acute onset of clinically compatible symptoms and subsequent laboratory evidence of infection. The recovery period for legionellosis can vary based on patient-specific factors. NJDOH consultation is encouraged for case classification of individuals without clear periods of recovery or subsequent acute illness onset.

Can a *Legionella* urinary antigen test be a false positive?

The *Legionella* urinary antigen test (UAT) is the most used laboratory test for diagnosis of Legionnaires’ disease. It detects a molecule of the *Legionella* bacterium in urine. The *Legionella* UAT has a sensitivity of 70-100% and a specificity of 95-100%. Specificity refers to the ability of a test to correctly identify patients with a disease. A diagnostic test with a high specificity therefore has few false positives. A positive *Legionella* UAT in the context of clinically compatible symptoms is considered strong evidence for an active *Legionella* infection.

Do household members or roommates need to be tested for *Legionella*?

Legionellosis is not contagious and cannot be spread from person to person. However, they should seek medical attention if they become sick. It is possible they were exposed to the same water source of *Legionella*. Their healthcare provider can determine if they need to be tested for *Legionella*.

When should I use the Legionellosis Cluster Hypothesis-Generating Questionnaire?

LHDs are encouraged to use the Legionellosis Cluster Hypothesis-Generating Questionnaire when there is an observed uptick in reported cases or when resources permit a more detailed investigation. This supplementary tool should be used alongside the standard risk factor questions within CDRSS. It is requested that any additional information gathered, beyond what is captured in the CDRSS fields, be documented in the comments section of CDRSS.

Managing Special Situations of a Single Case

While investigating cases of legionellosis, there may be single confirmed cases of legionellosis investigated in which an individual has identified a facility in which they reside or other possible exposure (e.g., hotel, gym, healthcare facility) during the incubation period of the disease. A single case-patient who reports exposure to a specific facility does not trigger a full investigation of the facility unless the facility is associated with a historical outbreak investigation, has a pattern of disease in the past, or the case-patient didn't leave the facility during the incubation period. However, the facility should be notified to raise awareness and prevent future cases of legionellosis (without breaching patient confidentiality rules). Below are examples which would warrant notification or additional follow up. LHDs may use and adapt these notification letter templates.

Cruise Ship-Associated Legionellosis Case

The LHD should complete the CDC Legionnaires' Disease Cruise Ship Questionnaire if a patient reports exposure to a cruise ship during their incubation period. This questionnaire includes questions regarding exposures associated with the cruise ship and other possible exposures not associated with the cruise ship. Be sure to capture the cruise line and ship name, departure port location (city, state), departure and return dates, and cabin number so that NJDOH/CDC can ensure the cruise ship is properly notified.

Possible Healthcare-Associated Case

When there is a single case of legionellosis possibly associated with a healthcare facility, the LHD of where the facility is located should notify the facility in writing of the case. This would be a case-patient who only spent part of the incubation period (<10 days) at the facility. The LHD may need to check with NJDOH to ensure no other cases are associated with the facility.

Assisted Living-Associated Case

When there is a single case of legionellosis possibly associated with an assisted living facility, the LHD of where the facility is located should notify the facility in writing of case. This would be a case-patient who only spent part of the incubation period (<10 days) at the facility. NJDOH does treat assisted living facilities with the same considerations as healthcare facilities because they house vulnerable populations and can have complex water systems. The LHD may need to check with NJDOH to ensure no other cases are associated with the facility.

Apartment Building-Associated Legionellosis Case

When there is a single case of legionellosis associated with an apartment building at increased risk for *Legionella* growth, the LHD of where the building is located should notify the building owner/manager in writing of the case. An apartment building at increased risk is defined as senior-housing or having 10+ floors. Buildings with centralized water systems are also at increased risk, but this information is often not readily available.

Travel-Associated Legionellosis Case

When there is a single case of confirmed legionellosis who reports staying at a travel accommodation for at least one night during the incubation period, the LHD of where the travel accommodation is located will be notified by NJDOH's Communicable Disease Service. The LHD should notify the travel accommodation in writing of the case and preventive measures the facility should take.

Hot Tub-Associated Legionellosis Case

When there is a single case of legionellosis possibly associated with hot tub, the LHD of where the hot tub is located should notify the owner/manager in writing of case. Hot tub exposure can occur in a variety of settings, such as fitness centers/gyms, hotels/resorts, community complexes, and garden shows with hot tub displays. The LHD may need to check with NJDOH to ensure there are no other reported cases are associated with the hot tub. For public recreational bathing facilities, the LHD may wish to review the hot tub maintenance log to determine if any breaks in sanitization or maintenance have occurred at the time of the case. If the spa chemistry or filtration was out of compliance at the time of inspection, the inspector can require the facility to perform a remediation of the hot tub.

Gym/Spa-Associated Legionellosis Case

When there is a single case of legionellosis possibly associated with a gym/spa, the LHD of where the facility is located should notify the facility in writing of case. The LHD may need to check with NJDOH to ensure there are no other reported cases are associated with the facility.

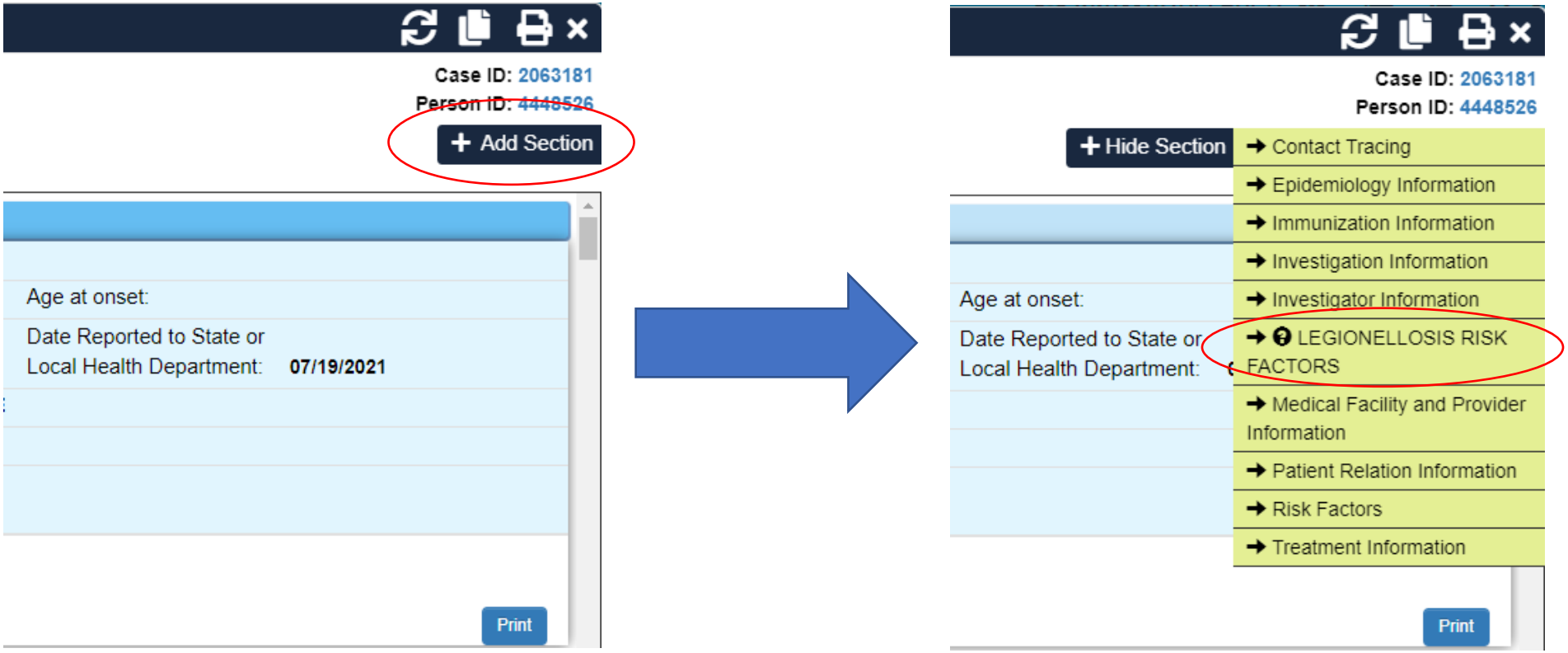
Possible Occupation-Associated Legionellosis Case

The LHD should obtain workplace name and address (street address, city) and ask the patient about any possible exposures to aerosolized water at work (e.g., decorative fountain in lobby, showering, industrial setting with water spray systems, etc.). Consider using aerial imagery to determine if there are any cooling towers on the property. If water exposures are noted, the LHD of where the facility is located should notify the facility in writing of the case. The LHD may need to check with NJDOH to ensure no other cases are associated with the facility.

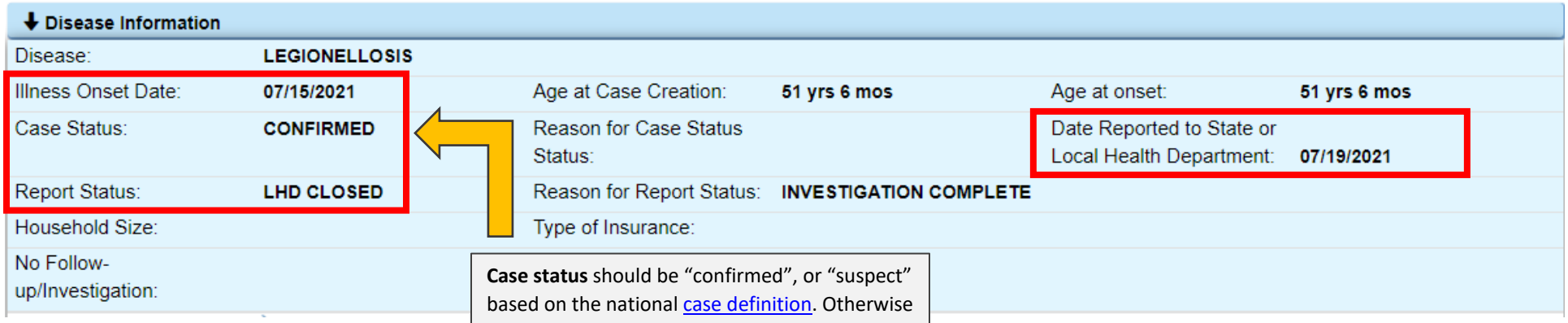
CDRSS Data Field Completion Guide

Local health departments should verify that all obtained data is entered into CDRSS prior to changing the report status to 'LHD closed'. Below is an example of a completed case investigation entered into CDRSS. The fields highlighted by **red boxes** are mandatory.

To add a section in CDRSS click on the button "+ Add Section" in the top right corner then select the section you would like to add. For legionellosis cases, you must add the section "LEGIONELLOSIS RISK FACTORS" manually.



Disease Information



Case status should be "confirmed", or "suspect" based on the national case definition. Otherwise select "not a case" or "out of state". Do not use possible or probable.

Patient Personal Information

Addresses

Addresses

Primary Address

Location Name:	**HOME**				
Street:	**135 E STATE ST**	Office/Suite/Apt:	**101**	City:	**TRENTON**
State:	**NJ**	County:	**MERCER**	Municipality:	**TRENTON CITY**
Zip:	**08608**				
Primary Phone:	**(555) 555-5555**	Secondary Phone:		Mobile Phone:	**(555) 555-5555**
Fax:		Email:			
Added By:	**ROSS KATHLEEN**	Added Date:	**07/19/2021**		

Edit Primary Address

Additional Address Information

Address Type:	**WORK PLACE**				
Location Name:	**NEW JERSEY DEPARMENT OF HEALTH**				
Street:	**369 S WARREN ST**	Office/Suite/Apt:		City:	**TRENTON**
State:	**NJ**	County:	**MERCER**	Municipality:	**TRENTON CITY**
Zip:	**08608**				
Primary Phone:		Secondary Phone:		Mobile Phone:	
Fax:					
Date range:	**01/01/2021 - 07/15/2021**				

Comments

Input By:	ROSS, KATHLEEN	**Comments:**
	(609) 826-5964	**Last day worked was 07/15/2021. Case-patient worked Monday-Friday during incubation period.**
Date/Time:	07/19/2021 12:52:02	
Comment Type:	Addresses	
Comment ID:	2223550	

Laboratory and Diagnostic Test Information

All positive *Legionella* laboratory tests should be entered, including test type and specimen type. The *Legionella* urinary antigen test (UAT) is the most used diagnostic test and is considered a confirmatory test. Respiratory specimens may also be collected for *Legionella* PCR and/or culture, which are also considered confirmatory tests. A negative respiratory specimen does not negate a positive *Legionella* urinary antigen test. Please consult with NJDOH when discordant results are reported.

Laboratory and Diagnostic Test Information

Laboratory Information

Test	Specimen	Lab Name	Lab Specimen ID	Date Specimen Collected	Value	Report Units	Result	Delete
LEGIONELLA PNEUMOPHILA 1 AG	URINE	NJPHEL	11223344	07/16/2021	DETECTED		POSITIVE/REACTIVE	
MICROORGANISM IDENTIFIED BY CULTURE	SPUTUM	NJPHEL	12345678	07/16/2021	LEGIONELLA PNEUMOPHILA SEROGROUP 1		POSITIVE/REACTIVE	
LEGIONELLA SP DNA	SPUTUM	NJPHEL	55667788	07/16/2021	LEGIONELLA PNEUMOPHILA SEROGROUP 1		POSITIVE/REACTIVE	

Diagnostic Information

Test Name	Findings	Test Result Data	Test Date	Medical Facility	Delete
C-SCAN	ABNORMAL	RLL pneumonia	07/17/2021	NJPHEL	
X-RAY	ABNORMAL	Infiltrates	07/16/2021	NJPHEL	

Add Diagnostic Test

Add Comment

All abnormal radiographic tests of the chest should be entered into CDRSS under “Diagnostic Information”. To enter a CXR or CT scan result, click on the button “Add Diagnostic Test”.

Legionella infection almost always produces an abnormal chest radiographic finding. Abnormalities are variable and no typical radiographic presentation exists for Legionnaires’ disease. Radiographic tests often show infiltrates with consolidation. Many patients also have a pleural effusion.

Clinical Status

Illness onset date will be prefilled if it was entered under the "Disease Information" section.

Clinical Status

Clinical Status Information

Illness Onset Date:	**07/15/2021**	Age at onset:			
Date of Initial Health Care Evaluation:	**07/16/2021**	Initial Diagnosis:	**PNEUMONIA**	Case Evaluated by Health Care Provider :	**YES**
Reason for Testing:		As part of this investigation, was patient hospitalized?:	**YES**		

Pre-Existing Conditions:

DIABETES MELLITUS, CHRONIC LUNG DISEASE (ASTHMA/EMPHYSEMA/COPD)

Patient Died? **NO**

If patient expired, select "yes" and enter date of death.

Signs and Symptoms

Signs and Symptoms

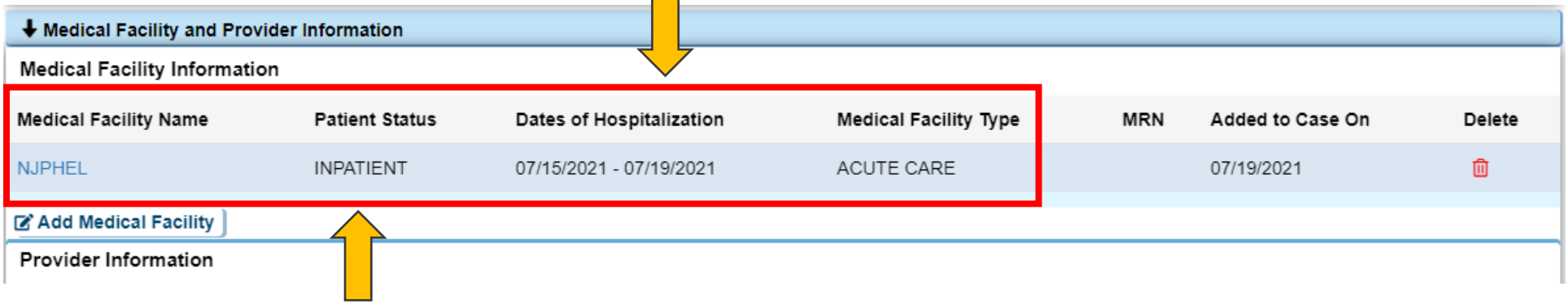
Sign/Symptom	Response	Attribute	Onset Date	Resolution Date
PNEUMONIA	YES	RLL pneumonia	07/16/2021	
CHEST PAIN	YES		07/15/2021	
COUGH	YES	PRODUCTIVE	07/15/2021	
FEVER	YES	HIGH	07/15/2021	
HEADACHE	YES		07/15/2021	
MALAISE (DISCOMFORT)	YES		07/15/2021	
SHORTNESS OF BREATH	YES		07/15/2021	

Evidence of clinically compatible disease can be determined several ways: a) a clinical or radiographic diagnosis of pneumonia in the medical record OR b) if "pneumonia" is not recorded explicitly, a description of clinical symptoms that are consistent with a diagnosis of pneumonia.

Clinical symptoms of pneumonia may vary but must include **acute onset of lower respiratory illness with fever and/or cough**.

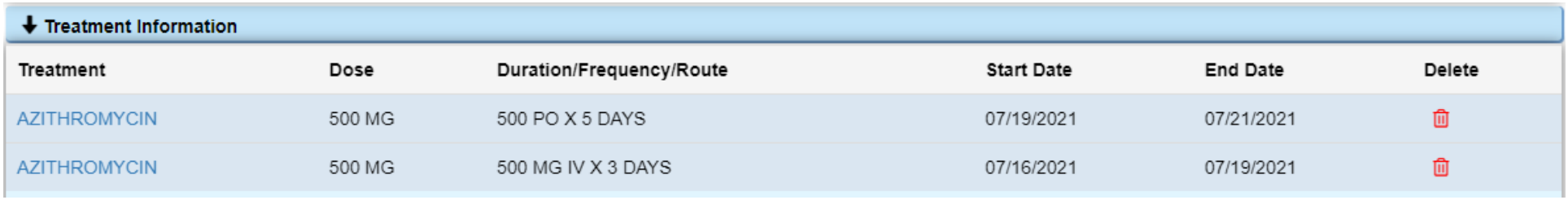
Medical Facility

Enter the hospital admission date (or date seen in ED/outpatient). If resources allow, follow up with hospital ICP to obtain discharge date.



For **patient status** select **emergency department, inpatient, or outpatient** to describe the visit. If the patient was hospitalized, select inpatient.

Treatment Information



Entering antibiotic treatment is not required but may be helpful when determining illness onset date for patients with complex medical histories and/or atypical onset of symptoms. NJDOH may request that LHDs obtain antibiotic history for suspect healthcare-associated cases.

Legionellosis Risk Factors

LEGIONELLOSIS RISK FACTORS	
*TYPE OF LEGIONELLOSIS DIAGNOSIS	**Legionnaires' disease (pneumonia, clinical or radiographically diagnosed)**
IN THE 14 DAYS BEFORE ONSET, DID THE PATIENT SPEND ANY NIGHTS AWAY FROM HOME (EXCLUDING HEALTHCARE SETTINGS)?	**Yes**
ACCOMMODATION NAME	**Hotel of New Jersey**
STREET ADDRESS	**135 E. State Street**
CITY	**Trenton**
STATE	**NJ**
ZIP	**08625**
COUNTRY	**USA**
ROOM NUMBER	**35B**
ARRIVAL DATE OF STAY	**07/03/2021**
DEPARTURE DATE OF STAY	**07/06/2021**
IN THE 14 DAYS BEFORE ONSET, DID THE PATIENT SPEND THE NIGHT AT ANY ADDITIONAL TRAVEL ACCOMMODATIONS?	**No**
IN THE 14 DAYS BEFORE ONSET, DID THE PATIENT GET IN OR SPEND TIME NEAR A WHIRLPOOL SPA OR HOT TUB?	**Yes**
DESCRIBE WHERE (LOCATION NAME AND ADDRESS)	**Hot tub at home**
DATE(S) OF EXPOSURE	**07/07/2021**
IN THE 14 DAYS BEFORE ONSET, DID THE PATIENT USE A NEBULIZER, CPAP, BIPAP, ROOM HUMIDIFIER, OR ANY OTHER RESPIRATORY THERAPY EQUIPMENT FOR THE TREATMENT OF SLEEP APNEA, COPD, ASTHMA OR FOR ANY OTHER REASON?	**Yes**
DOES THIS DEVICE USE A HUMIDIFIER?	**Yes**
WHAT TYPE OF WATER IS USED IN THE DEVICE? (CHECK ALL THAT APPLY)	**Sterile**
IN THE 14 DAYS BEFORE ONSET, DID THE PATIENT VISIT OR STAY IN A HEALTHCARE SETTING?	**Yes**
TYPE OF HEALTHCARE SETTING/FACILITY	**Hospital**
NAME OF HEALTHCARE FACILITY	**Hospital of New Jersey**
IS THIS FACILITY ALSO A TRANSPLANT CENTER	**Yes**
STREET ADDRESS	**135 E. State Street**
CITY	**Trenton**
STATE	**NJ**
START DATE OF VISIT/ADMISSION DATE	**07/08/2021**
END DATE OF VISIT/DISCHARGE DATE	**07/08/2021**
REASON FOR VISIT	**Surgery**
TYPE OF EXPOSURE	**Outpatient**
IN THE 14 DAYS BEFORE ONSET, DID THE PATIENT VISIT OR STAY IN AN ASSISTED LIVING FACILITY OR SENIOR LIVING FACILITY (INCLUDING INDEPENDENT LIVING)?	**Yes**
TYPE OF FACILITY	**Assisted Living**
TYPE OF EXPOSURE	**Visitor/Volunteer**
NAME OF FACILITY	**Assisted Living of NJ**
STREET ADDRESS	**135 E. State Street**
CITY	**Trenton**
STATE	**NJ**
DATES PATIENT WAS AT FACILITY IN THE 14 DAYS PRIOR TO ILLNESS ONSET	**07/10/2021**

If patient is lost to follow up and unable to be interviewed, please enter “unknown” for the risk factor questions and document “lost to follow up” in the comments.

IN THE 14 DAYS BEFORE ONSET, DID THE PATIENT ATTEND A CONVENTION, RECEPTION, CONFERENCE, OR OTHER PUBLIC GATHERING?	**Yes**
LOCATION OF EXPOSURE (FACILITY NAME, ADDRESS, CITY, STATE)	**Garden Show at NJ Conference Center located at 135 E. State Street, Trenton, NJ**
DATE(S) OF EXPOSURE	**07/12/2021**
IN THE 14 DAYS BEFORE ONSET, WAS THE PATIENT NEAR A DECORATIVE FOUNTAIN OR WATER FEATURE?	**Yes**
LOCATION OF EXPOSURE (FACILITY NAME, ADDRESS, CITY, STATE)	**Decorative fountain at the mall of NJ located at 135 E. State Street, Trenton, NJ**
DATE(S) OF EXPOSURE	**07/12/2021**
IN THE 14 DAYS BEFORE ONSET, WAS THE PATIENT NEAR A WATER MISTER?	**Yes**
DESCRIBE TYPE OF MISTER	**Cooling mister at restaurant**
LOCATION OF EXPOSURE (FACILITY NAME, ADDRESS, CITY, STATE)	**Restaurant of NJ located at 135 E. State Street, Trenton, NJ**
DATE(S) OF EXPOSURE	**07/12/2021**
IN THE 14 DAYS BEFORE ONSET, WAS THE PATIENT NEAR AN OPERATING WATER SPRINKLER SYSTEM?	**Yes**
DESCRIBE TYPE OF SPRINKLER	**Lawn sprinkler at golf course**
LOCATION OF EXPOSURE (FACILITY NAME, ADDRESS, CITY, STATE)	**Golf Club of NJ located at 135 E. State Street, Trenton, NJ**
DATE(S) OF EXPOSURE	**07/13/2021**
IN THE 14 DAYS BEFORE ONSET, DID THE PATIENT VISIT A WATER PARK?	**No**
IN THE 14 DAYS BEFORE ONSET, DID THE PATIENT SHOWER AWAY FROM HOME?	**Yes**
LOCATION OF EXPOSURE (FACILITY NAME, ADDRESS, CITY, STATE)	**At work (office building locker room)**
DATE(S) OF EXPOSURE	**07/10/21, 07/11/21, and 07/12/21**
HAS THERE BEEN ANY RECENT (LAST 6-12 MONTHS) OR ONGOING MAJOR CONSTRUCTION AT OR AROUND THE PATIENT'S RESIDENCE?	**Yes**
DESCRIBE TYPE OF WORK	**Water main break**
DID THE CONSTRUCTION RESULT IN DISRUPTIONS OR CHANGES TO THE WATER (E.G., LOSS OF WATER, CHANGES IN WATER PRESSURE)?	**Yes**
DID THE CONSTRUCTION RESULT IN DISRUPTIONS OR CHANGES TO THE WATER (E.G., LOSS OF WATER, CHANGES IN WATER PRESSURE)?	**Yes**
IN THE 14 DAYS BEFORE ONSET, DID THE PATIENT HAVE ANY EXPOSURE TO AEROSOLIZED WATER AT HOME?	**Yes**
DESCRIBE TYPE OF EXPOSURE	**Hot tub use and washing the car**
DATE(S) OF EXPOSURE	**07/07/2021**
DOES THE PATIENT WORK OR VOLUNTEER IN CONSTRUCTION OR OTHER OCCUPATIONS INVOLVING WATER EXPOSURES?	**Yes**
DESCRIBE TYPE OF WORK AND EXPOSURES TO WATER	**Volunteers as a lifeguard at NJ youth camp located at 135 E. State Street, Trenton, NJ**
DATE(S) OF EXPOSURE	**07/02/2021**

Please utilize the comments section in CDRSS if additional information needs to be documented. For example, if you used the hypothesis generating questionnaire to interview the patient.

III. OUTBREAK INVESTIGATION PROCEDURES

The following recommendations are intended to help epidemiologists and other public health officials make decisions as they investigate common outbreak scenarios and should not be considered exhaustive.

General investigative steps are described below. Public health officials may have already performed several steps during their routine evaluation of Legionnaires' disease case reports. Many of these steps will occur simultaneously or will vary during an investigation.

Every outbreak investigation is unique and requires careful planning and periodic reassessments to determine the most appropriate response, with consideration given to personnel, resources, or other competing priorities within the local health department. NJDOH is available for consultation and assistance: ICHEE.Water@doh.nj.gov.

ROLES AND RESPONSIBILITIES

Outbreak Response and Investigation

The Centers for Disease Control and Prevention and NJDOH defines an outbreak as two or more cases of legionellosis associated with the same possible source during a 12-month period. Outbreaks are commonly associated with buildings or structures that have complex water systems, like hotels and resorts, long-term care facilities, hospitals, and cruise ships. The most likely sources of infection include water used for showering, hot tubs, decorative fountains, and cooling towers. In addition, there are instances when a single case would prompt an outbreak investigation.

All LHDs should report any suspect or confirmed legionellosis outbreaks via email/phone immediately upon detection to NJDOH (contact your regional epidemiologist or email the NJDOH *Legionella* Team at: ICHEE.Water@doh.nj.gov).

Jurisdictional Leads

N.J.A.C. 8:57-1.10 states that when a health officer receives a communicable disease or outbreak report, they shall conduct an investigation, with direction given by the NJ Department of Health, to determine if an outbreak of a disease exists, ascertain the source of the illness, and implement control measures to limit the spread of the disease. Case-patients often reside in different jurisdictions than where their exposures occurred. If a building is under investigation as a potential source of *Legionella* exposure, then the local health department with jurisdiction over the facility's municipality is responsible for conducting the outbreak investigation. NJDOH may require more than one health officer to participate in the investigation, typically when community-wide transmission is suspected.

Below are some examples of activities that the Local Health Department is expected to do:

- Obtain relevant medical records when appropriate
- Facilitate the transfer of clinical specimens or isolates
- Facilitate conference calls and site visits with the facility and NJDOH
- Provide written communications and recommendations to the facility
- Regularly follow up with the facility for progress updates, including but not limited to environmental sampling results and remediation progress
- Maintain records pertinent to the investigation
- Enforce public health laws and regulations, including mitigating health hazards and ensuring proper notification

The NJDOH recognizes that legionellosis outbreak investigations may require technical expertise therefore are able to provide support to the LHD while not assuming the lead role. This may transition to a joint investigation with LHD/NJDOH if the situation becomes more extensive (i.e., outbreak involves multiple jurisdictions). However, upon request, the NJDOH can provide the following support:

- Lead discussions during the initial conference call and site visit
- Provide evidence-based recommendations for the facility
- Provide template letters and other resources to LHD for facility (i.e., water management program toolkit, notification letters)
- Assist with review and analysis of collected data
- Review the Water Management Programs to ensure adherence to ASHRAE Standard 188-2021
- Participate in investigation follow-up conference calls as needed

DEFINING OUTBREAKS

When identifying a suspected outbreak, or receiving a report of a suspected outbreak, the first step is to determine if further investigation is needed. The setting can impact this decision. See the following situations would which "trigger" an outbreak investigation.

Healthcare Facilities[1]

- ≥ 1 presumptive healthcare-associated case, defined as case with ≥10 days of continuous stay at a healthcare facility during the 14 days before onset of symptoms
    - Consult with NJDOH if the patient spent 10 nights of their 14-day incubation at the facility, but left the facility during the day
- ≥ 2 possible healthcare-associated cases within a 12-month period
- ≥ 3 possible healthcare-associated cases regardless of time frame
- ≥ 1 possible healthcare-associated case following a previously recognized outbreak at the same facility

Non-Healthcare Facilities[2]

- ≥ 2 cases associated with the same possible source within a 12-month period
- ≥ 3 cases associated with the same possible source regardless of time frame
    - ≥ 3 cases associated with a facility, with more than 12 months between each case
    - ≥ 1 case following a previously recognized outbreak at the same facility

Community-Associated Outbreaks

- An increase in Legionnaires' disease cases in a certain geographic area beyond what one would normally expect for that time and place
- NJDOH conducts weekly analyses for unusual clustering of Legionnaires' disease case across the state

Special Considerations

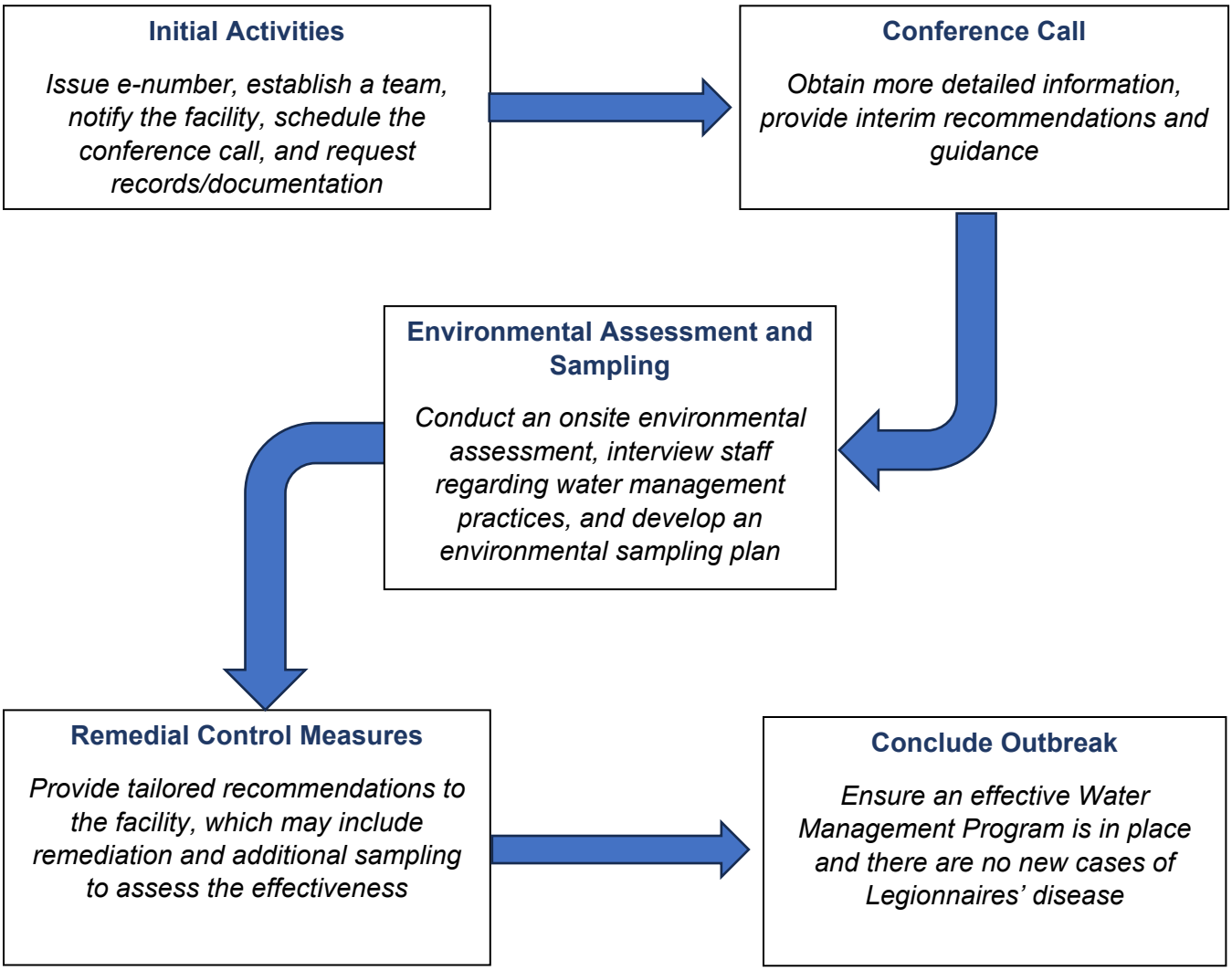
- ≥ 1 case at a facility where people generally do not leave the premises, including but not limited to assisted living facilities, correctional facilities, and group homes, is treated with the same considerations as a healthcare-associated outbreak
    - These facilities often house at-risk populations and can have large, complex building water systems. Because residents may have limited or no exposures outside these facilities, it is important to consider these facilities as likely sources in outbreak investigations.
- If epidemiologic evidence is not strong enough to warrant a full investigation (i.e., two cases associated with a facility but > 12 months apart), consider at least conducting an environmental assessment to determine if conditions for *Legionella* growth exist in the facility, particularly if the building is at increased risk for *Legionella* growth and transmission
    - Consult with NJDOH's *Legionella* Team to determine if further investigation is warranted

1. Healthcare facilities include acute-care, long-term care, psychiatric, critical access, skilled nursing, inpatient hospice, rehabilitation, ambulatory care, dialysis, dental, outpatient, etc.
2. Settings may include but are not limited to travel accommodations (hotels, resorts, vacation home rentals, campgrounds, RV parks, river and ocean cruises, truck stops, homes of family and friends), apartment complexes, gyms, spas, casinos, office buildings, etc.

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.



Outbreak Investigation Protocol: *Initial Outbreak Investigation Activities*

1. **E-number:** When a case of legionellosis is reported and meets the criteria for an outbreak investigation, **NJDOH** will generate a unique outbreak identification number, known as an e-number, using the Outbreak Module within the Communicable Disease Reporting and Surveillance System (CDRSS).

2. **Establish Team:** Once the e-number is assigned, the **LHD with jurisdiction over the affected facility** will establish a *Legionella* Investigation Team, which may include the Health Officer, Disease Investigator, Public Health Nurse, and/or Registered Environmental Health Specialist. The Health Officer should designate a primary LHD Team Lead. NJDOH staff will be part of the team to provide technical support and guidance.

3. **Facility Notification:** After the team is established, the **LHD** will formally notify the facility's manager or owner in writing as soon as possible. This notification is crucial for informing them about the public health investigation and outlining the necessary next steps. Template letters for this communication can be found via the links provided below.

4. **Scheduling Conference Call:** The **LHD** will schedule a 1-hour conference call with the **facility and NJDOH** which should take place within 5 business days from the initial facility notification. This call should include the facility owner or manager and a knowledgeable representative familiar with the building's water systems. For healthcare facilities, it's important to have the administrator, director of nursing, or infection preventionist on the call as well.

LHD Checklist

☐ Link the outbreak identification number (e-number or i-number) to associated CDRSS case(s)

☐ Assign LHD staff member(s) to be part of the *Legionella* Investigation Team

☐ Send written notification to the facility manager or owner

☐ Schedule a conference call with the facility to take place within **5 business days** after facility notification

☐ Create a meeting invitation via Zoom, Microsoft Team, or conference line and send the meeting invite by email to all parties (note: can request NJDOH to do this on behalf of LHD)

☐ Request the following records from the facility to be provided ≥24 hours prior to the initial conference call:

- *Facility Background Assessment Tool (required)*
- *Water Management Program (if available)*
- *Environmental Legionella test results from 12 months before patient's illness onset to the current date (if available)*

Resources

- Template Letter to Notify Healthcare Facility of One Presumptive HAI LD Case
- Template Letter to Notify Healthcare Facility of Two Possible HAI LD Cases in 12 Months
- Template Letter to Notify Non-Healthcare Facility of Two LD Cases in 12 Months
- Facility Background Assessment Tool *(available upon request)*

Outbreak Investigation Protocol: *Conference Call and Interim Recommendations*

1. **Public Health Pre-Call:** The **LHD and NJDOH** will have a 15-minute pre-conference call to review the epidemiological investigation and prepare for the upcoming meeting with the facility. If LHD has limited recent experience, then allocate 30 minutes for this preparatory call. Please note that the conference call with the facility should not be delayed to facilitate the pre-call.

2. **Conference Call with Facility:** Next, the LHD/NJDOH will host the conference call between **the facility and *Legionella* Investigation Team**, following this format:
   - **Introductions**: LHD will lead introductions including names, titles, and organizations. [LHD]
   - **Disease Background:** Provide a brief overview of *Legionella* and Legionnaires' disease. [LHD or NJDOH]
   - **Clinical Details (Healthcare Facilities Only):** Verify and confirm any outstanding clinical details related to the case-patient as part of the epidemiological investigation. [LHD]
   - **Facility Background Request Form Review:** Review completed Facility Background Request Form to understand the building's water system configuration. [NJDOH]
   - **Interim Recommendations:** Based on the epidemiological data and the building's water system configuration, verbally provide standardized recommendations including implementation of immediate control measures (as needed based on setting), hiring a third-party environmental consultant, scheduling an onsite environmental assessment, and conducting environmental sampling for *Legionella* testing. [NJDOH]
   - **Questions and Answers:** Allow time for participants to ask questions and discuss any concerns.
   - **Next Steps:** Conclude the meeting by discussing the next steps, including providing written recommendations to the facility and scheduling an onsite visit for further investigation. [LHD/NJDOH]

3. **Post-call:** After the conference call, NJDOH will send standardized draft recommendations to the LHD. These recommendations are meant for the facility to follow. The LHD will then need to review, edit, and finalize these recommendations before sharing them with the facility within 2 business days.

LHD Checklist

☐ Schedule a pre-conference call with NJDOH and review conference call script and agenda

☐ Prepare a summary of the LD case(s) for the conference call (healthcare facilities only)

☐ Conduct the conference call with the facility:
- Lead introductions
- Provide disease background
- Review clinical details and case investigation findings (healthcare facilities only)
- Conclude the meeting with next steps

☐ Receive draft written interim recommendations from NJDOH (typically within 2 business days)

☐ Prepare and format interim recommendations:
- Use LHD letterhead or LHD logo
- Add the date, LHD contact information, and any missing details

☐ Send finalized recommendations to the facility within 2 business days after receipt of draft from NJDOH

Resources

- Conference Call Script *(available upon request)*
- Conference Call Agenda *(available upon request)*
- Providing Recommendations During a LD Outbreak Investigation Guidance

Outbreak Investigation Protocol: *Environmental Assessment and Sampling*

1. **Scheduling the Assessment:** After the facility has engaged a consultant, the **LHD** will coordinate with the *Legionella* Investigation Team (LHD and NJDOH), the facility's staff, and the consultant to schedule the onsite environmental assessment, typically within 5-20 business days after the call.

2. **Self-Assessment:** The **LHD** will send the *Legionella* Environmental Assessment Form (LEAF) to the facility for completion before the onsite assessment, with assistance from the consultant. The LEAF should be returned ≥24 hours prior to the site visit.

3. **Onsite Environmental Assessment:** The ***Legionella* Investigation Team** will conduct an onsite assessment of the facility's water systems and devices. Since each building's water system is unique, the team will collaborate with the facility's engineering personnel who are familiar with the premise plumbing system. As a resource to the LHD, the NJDOH can lead the onsite environmental assessment while providing real-time training to the LHD team members. The assessment typically includes an evaluation of the building's water systems and its operations, including how potable water is received, treated, conditioned, heated, distributed, and comes into contact with building occupants. Facility staff will be interviewed about water management practices such as flushing, cleaning, disinfection, and maintenance. At the conclusion of the site visit, there will be an exit meeting where the team provides immediate feedback regarding water management practices.

4. **Environmental Sampling**: After the site visit, **NJDOH** will provide the **LHD** with an Environmental Sampling Plan detailing the recommended number and locations of samples. Sampling is typically conducted by a third-party consultant, with the facility responsible for all associated costs. The facility/consultant must follow NJDOH's Environmental *Legionella* Testing Guidance; otherwise, NJDOH may advise the LHD to reject the results. The facility should conduct sampling within 5 business days of receiving the environmental sampling plan and provide the LHD with the completed Environmental *Legionella* Sampling Data Sheet, original laboratory results, and the chain of custody within 24 hours or receipt. Results are usually available within 7-15 days.

LHD Checklist

☐ Send a reminder to the facility 1-2 days before the site visit to confirm parking details and meeting location (e.g., lobby)

☐ Conduct the environmental assessment

☐ Obtain any outstanding information or records that were not readily available during the site visit

☐ Receive the draft environmental sampling plan from NJDOH, typically within 5 business days, though delays may occur if the facility has not provided all requested records

☐ Prepare and format environmental sampling plan
- Use LHD letterhead or LHD logo
- Add the date, LHD contact information, and any missing details

☐ Send the finalized environmental sampling plan to the facility within 2 business days of receiving the draft from NJDOH

☐ Determine the tentative date that the facility plans to conduct environmental sampling

☐ Follow up with the facility to obtain the results and chain of custody if they are not received within 15 days of the sampling date

Resources

- *Legionella* Environmental Assessment Form
- Environmental Sampling and Testing Guidance
- Environmental *Legionella* Sampling Data Sheet
- Site Visit Agenda and Sign-in Sheet *(available upon request)*

Outbreak Investigation Protocol: *Hazard Assessment and Remedial Control Measures*

1. **Site Visit Recommendations**: When sharing the environmental sampling plan with the LHD, NJDOH will provide recommendations based on the findings from the site visit. This will detail the assessment findings, highlight issues in water management practices, and offer recommendations for improvements. **At this time, or after receiving the environmental sampling results, NJDOH may recommend additional remedial actions based on available epidemiological, environmental, and microbiological data.**

2. **Chemical Shock Remediation:** NJDOH will recommend a chemical shock treatment for the potable hot and/or cold water system under the following circumstances:
   - A presumptive healthcare-associated case among a resident who spent their entire incubation period in the facility, and potable water is suspected to be the source of infection,
   - *Legionella* is detected in the potable hot and/or cold water system, **OR**
   - A presumptive healthcare-associated case among a resident who briefly left the facility during the day. Determinations will be made on a case-by-case basis by SMEs based on environmental assessments, water quality parameters, recent *Legionella* detections prior to the outbreak, and the facility's history of Legionnaires' disease cases.

   Chemical shock remediations involve using high concentrations of chemical disinfectants for a short period to reduce the burden of *Legionella* in a potable water system. The facility is responsible for all associated costs. While NJDOH does not approve remediation plans, it is essential for consultants to provide a detailed remediation plan to ensure the procedure's effectiveness. For more information, refer to NJDOH's *Chemical Shock Remediation Guidance*.

3. **Post-Remediation Sampling:** Facilities must verify the effectiveness of the remediation by conducting environmental sampling for *Legionella* testing 3 to 7 days later (no sooner than 48 hours after returning to normal operating conditions). Facilities should review these results, investigate any *Legionella* detections, and adjust water management practices as needed before resampling, which should occur every 2 to 3 weeks. No more than 14 days should pass between receiving the results and conducting the next sampling event. Once there are three consecutive sampling events with no detectable levels of *Legionella*, the facility can transition to monthly sampling after consulting with the LHD. If monthly sampling shows no detectable levels of *Legionella* for three consecutive months, the facility can discontinue investigative sampling. For more information regarding corrective actions, refer to NJDOH's *Responding to Post-Remediation Environmental Legionella Detections Guidance*.

LHD Checklist

☐ Review, edit, and finalize site visit recommendation report(s) and share with the facility ☐ Request a copy of the remediation plan and ensure all site visit recommendations have been implemented prior to implementation (e.g., removal of dead legs, repairing failing equipment) ☐ Meet with the facility/consultant to discuss any concerns related to the remediation plan, as needed	☐ Obtain a copy of the remediation report ☐ Verify that post-remediation sampling will not occur any sooner than 48 hours after the system returns to normal operating conditions ☐ Routinely follow-up with the facility to ensure environmental sampling is occurring and results are being shared (at minimum, follow-up every 21 days)

Resources

- Chemical Shock Remediation Guidance
- Responding to Post-Remediation Environmental *Legionella* Detections Guidance

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 ☐ Verify with NJDOH that the investigation meets the criteria to be concluded ☐ After verification, formally conclude the outbreak investigation and issue a Close Out Letter to the facility ☐ If building occupants were notified of the outbreak investigation, they should also be notified of the conclusion of the investigation	☐ 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 ☐ Conduct an after-action debriefing or "hotwash" to discuss lessons learned and to identify areas for improvement and training needs ☐ Maintain outbreak investigation records

Resources

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

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.

<u>Interim recommendations applicable to healthcare settings</u>:

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.

a. Maintain of line list of individuals meeting these criteria and report positive findings to the local health department.
b. If the facility does not have the capability to perform chest x-rays or order *Legionella*-specific testing, then they must ensure the receiving hospital test for *Legionella* upon admission.
c. Even in the absence of cases, healthcare providers should consider Legionnaires' disease as a possible diagnosis in any patient at risk for Legionnaires' disease with healthcare-associated pneumonia.

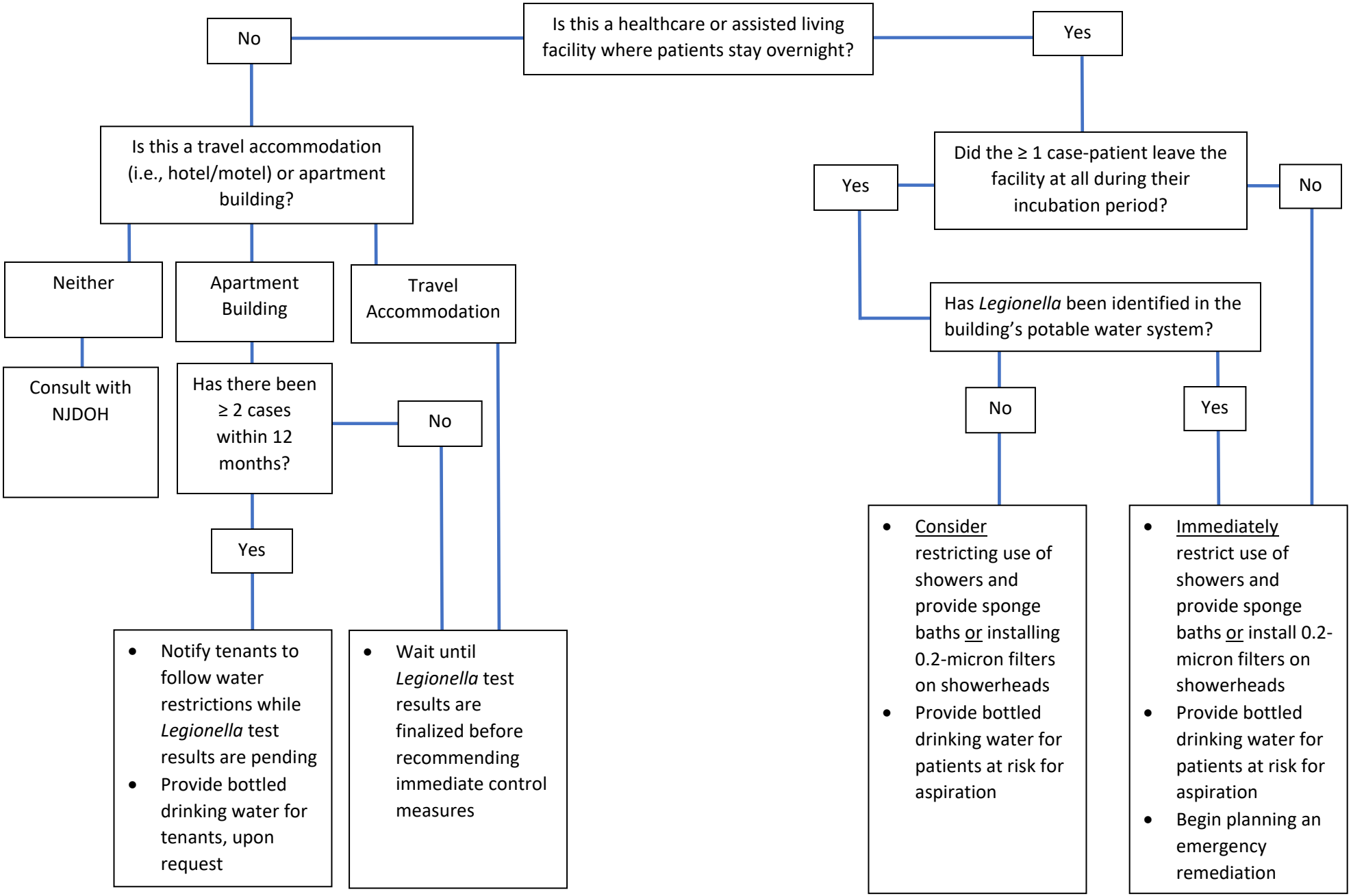
4. If ≥ 1 case-patient did not leave the facility at all during the incubation period (14 days prior to illness onset):
    a. Immediately install 0.2-micron or less pore size biological point-of-use filters conformant with requirements of ASTM F838 *(Standard Test Method for Determining Bacterial Retention of Membrane Filters Utilized for Liquid Filtration)* on all showerheads intended for use or restrict showers and use sponge bath instead.
        i. Point-of-use filters must be installed, maintained, and replaced in accordance with original manufacturer's instructions and recommendations. Ensure to verify operational specification requirements for the temperature, pressure, and chemical levels that filters can withstand. If the manufacturer's instructions, recommendation and specifications are not followed, filters may fail and increase risk of microbial growth.
    b. Perform an emergency remediation of the building's potable hot water system to immediately minimize or eliminate *Legionella* growth and risk of transmission to the building occupants. It is crucial that emergency remediation should not be delayed due to pending environmental sampling and laboratory reporting of the water sampling results.

Interim recommendations applicable to all settings (including healthcare):

1. Hire a third-party environmental consultant who has training and experience in hazard analysis of critical control points principles (HACCP) application for management of building water systems, potable and non-potable water treatment, and environmental focused water consulting services. In addition, the consultant must have robust expertise and knowledge in management and decontamination of *Legionell*a bacteria in large and complex engineered building water systems, establishing short-term and long-term HAACP driven control measures, and performance of validation sampling. NJDOH does not recommend or endorse consultants, however, a list of consultants is available upon request. Facilities may choose a consultant who is not on the list.

2. Schedule an onsite environmental assessment with representatives from the Local Health Department, New Jersey Department of Health, and the facility, including the consultant.
3. Develop and implement an environmental sampling plan as indicated by the site visit.
    a. Collect 1-liter (1000 mL) bulk water samples for *Legionella* culture, including species and serogroup identification, at a CDC ELITE member laboratory.
    b. If the sample bottles are not pre-treated, 0.5 mL of 0.1N sodium thiosulfate must be added to each 1000 mL bottle to neutralize residual disinfectants.
    c. Each sample should be a first draw sample, unless otherwise specified. In addition, for each sampling location, measure and record water quality parameters (temperature, pH, and disinfectant residual).
    d. All collected samples must be labeled with a unique identifier and recorded on an Environmental Sample Data Sheet and chain of custody, including type of sample and sampling location.
    e. Recommended sampling locations include incoming cold water, each hot water tank (at or near the bottom), each expansion tank for potable water, hot water return line, and from approximately 10% of the rooms and other areas with water fixtures (including all areas the case-patient could have been exposed to).
    f. Ensure that the laboratory processes the entire volume for the type of sample collected and the test conducted. For instance, collecting and processing a full liter (1000 mL) for culture is recommended for potable water. Note: 250 mL is the minimum recommended sample volume for routine environmental sampling of potable water for *Legionella* in the absence of cases.
    g. The limit of detection (LOD) for *Legionella* culture testing for potable water must be less than or equal to 0.1 colony forming units per milliliter (CFU/mL) and for non-potable LOD must by less than or equal to 5 CFU/mL.
    h. Share results with the Local Health Department within 24 hours of receipt.
4. Review your water management practices and ensure you are adhering to recommended best practices for your facility, including NJDOH's Recommended Best Practices for *Legionella* Prevention and Water Management.

For facilities that house at-risk individuals (assisted/senior living, correctional facilities), consider what immediate control measures can be implemented to protect people from exposure to aerosolized water while environmental testing results are pending. It is strongly recommended to consult with NJDOH regarding recommended water restrictions based on epidemiological and environmental information. Refer to the decision-making algorithm when considering immediate control measures.



If there is strong evidence that the facility is the source of *Legionella* exposure (i.e., several cases in < 12 months) then NJDOH will recommend immediate control measure which may include microbial filters, bottled drinking water, remediation, and notification to building occupants.

Emergency (Short-Term) Remediation Recommendations

The following recommendations may be made when a facility needs to perform a remediation of a building's potable water system and/or other device(s) to immediately minimize the risk of *Legionella* growth and transmission. This determination is made based on available epidemiological, environmental, and/or microbiological information. NJDOH will assist LHDs to determine when a remediation is warranted.

Be aware that "emergency" remediations are considered temporary measures. *Legionella* is likely to reappear if a building or device water system is not properly maintained following remediation. Please note that thermal remediations (e.g., "super-heating") of building water systems are not recommended due to frequent failure and rapid recolonization of *Legionella*.

Potable Water Systems

1. Submit a remediation plan to the LHD prior to implementation. The plan must include preparation activities such as cleaning of hot water tanks and removal of dead legs, tentative date of remediation procedure and who is conducting it, disinfectant type, concentration, and contact time. Refer to NJDOH's Chemical Shock Remediation Guidance for Building Water Systems before developing and implementing a remediation of a potable water system.
2. Perform an emergency chemical shock remediation, as defined by ASHRAE Guideline 12-2020, of the building's potable hot water system to immediately minimize the risk of *Legionella* growth and transmission.
    a. Prior to the implementation of the emergency remediation, stakeholders (e.g., residents, staff, visitors) at the facility must be informed that this process will take place to facilitate safe implementation of the emergency procedures. After the remediation process is complete, communication must occur to inform stakeholders that the water is acceptable for general use.
        i. Licensed healthcare facilities in accordance with N.J.S.A. 26:2H-1 et seq. must notify the Department of the planned water disruption.
    b. Repeat rounds of remediation may be warranted based on how the water system responds to the initial emergency remediation procedure.
    c. Provide written documentation to the Local Health Department when the remediation procedure has been completed.
3. Assess the efficacy of the emergency remediation by collecting 1-liter (1000 mL) bulk water samples for *Legionella* culture to be analyzed at a CDC ELITE member laboratory. Sampling will occur within 3 to 7 days post-remediation (no sooner than 72

hours) and then at 2-week intervals for 3 months. If *Legionella* species are not detected in culture during 3 months of monitoring at 2-week intervals, collect cultures monthly for another 3 months.

a. Remove 0.2-micron biological point-of-use filters prior to sampling (if applicable).
b. For each sampling location, record the temperature, pH, and disinfectant residual.
c. For samples that result in detectable levels of *Legionella*, continue to sample from that location until there are three consecutive rounds of sampling with non-detectable levels. At this point, an alternative sample location can be picked at the discretion of the sampler.
d. If *Legionella* species are detected in one or more cultures, reassess, modify, and repeat remediation procedures.
e. Share all testing results with the Local Health Department within 24 hours of receipt.

Cooling Towers

1. If possible, immediately remove heat load from the cooling systems and shut off fans associated with the cooling equipment. Notify the LHD if the cooling tower system must remain on due to heat related concerns for building occupants.
2. Immediately perform an emergency cleaning and disinfection per ASHRAE Guideline 12-2020.
    a. If necessary, retain the services of a qualified consultant with specific expertise in managing *Legionella* bacteria in cooling tower water systems to implement remediation activities. It is recommended to perform physical cleaning and disinfection of all equipment associated with the cooling tower system including cooling tower fill media, drift eliminators, nozzles, distribution deck, air intake louver, equalizer lines, basins, remote sumps, strainers, chillers, heat exchangers, filtration system, valves, bypass piping, and all system equipment/devices including standby or on-demand components.
    b. Provide written documentation to the Local Health Department (LHD) when the remediation procedures have been completed.
3. Collect validation bulk water and biofilm swab samples for *Legionella* testing following completion of the cleaning and disinfection procedure to detect whether *Legionella* bacteria remain present.
    a. The samples should be taken no sooner than 24-hours after the system is placed back in operating condition (general rule: 3-7 days after shocking the system).
    b. Share all *Legionella* testing results with LHD within 24 hours of receipt.

4. Evaluate the cooling tower system water chemistry to ensure the operations and controls for the recirculating water are within the parameters (pH, conductivity, total dissolved solids (TDS), total suspended solids, hardness, alkalinity, biocide, scale, corrosion, and inhibitor chemicals) established by the manufacturer. Correct any anomalous conditions or deficiencies.
5. Ensure that a proper water treatment system is installed, calibrated, primed, and functioning to control microbial fouling, scale, corrosion, sediment.
    a. It is imperative that cooling tower system must not be placed back in operation without application of a proper water treatment program consisting of oxidizing biocide, non-oxidizing biocide and scale/corrosion inhibitors. In absence of a proper water treatment program the cooling tower system recirculated water quality conditions will rapidly deteriorate return to its pre-treatment state.
6. Retain the services of a qualified engineering firm or consultant with experience in *Legionella* to develop and implement a comprehensive Water Management Program for the cooling tower.

Hot Tubs

1. Close the hot tub immediately and shut down the hydrotherapy jets and circulation pumps. Before draining the water, contact your Local Health Department to determine if you need to collect water samples for *Legionella* testing.
2. Perform a disinfection per Hot Tubs Disinfection Guidance from the Centers for Disease Control and Prevention.
3. Collect validation bulk water and biofilm swab samples to detect whether *Legionella* bacteria remain present. The samples should be taken no sooner than 24-hours after the system is placed back in operating condition.
    a. Keep the hot tub closed until testing confirms the elimination of *Legionella*. If laboratory testing is positive for *Legionella*, repeat the disinfection procedure until all testing is negative.
4. Ensure water quality prior to reopening the hot tub for use. Ensure that halogen (chlorine or bromine) and pH levels meet local and state standards.
5. Continue to assess the efficacy of the disinfection procedure by collecting samples for *Legionella* culture at 2-week intervals for 3 months. If *Legionella* species are not detected in culture during 3 months of monitoring at 2-week intervals, collect cultures monthly for another 3 months. If testing finds *Legionella* at any time during this 6-month period, disinfection again and start the testing schedule over.

Notification Recommendations

Public health may recommend that a facility notify residents, tenants, guests, visitors, and staff based on the setting of the suspected outbreak and population at risk, the number of

associated outbreak cases and when they occurred, and/or the findings from the environmental assessment or sampling.

Healthcare Facilities

1. If ≥ 1 presumptive healthcare-associated case, or ≥ 2 possible healthcare-associated cases are identified in a 12-month period, then the facility should notify patients/residents, families, and staff.
    a. Patients (and/or their designated contacts or legal representatives) should receive clear information in plain language about disease basics such as the cause, sources, risk factors, and symptoms of the disease. It is important to communicate what actions the facility is taking to protect patients from exposure to *Legionella* and a point of contact should the patient have questions.
    b. Staff and visitors should receive clear information in plain language about disease basics such as the cause, sources, risk factors, and symptoms of the disease. It should also address how the facility would like employees and others to proceed if they are sick or worried about having been exposed, and how to speak with their doctor about the exposure. Further, the issue of personal protective equipment (PPE) consistent with or beyond that already used in the healthcare setting may arise if there are employees or others at higher risk (whether due to personal medical history or exposure risks due to job duties). Points of contact within the organization and the public health agency, information about employee rights, and sources for additional information should also be clearly communicated.
    c. Healthcare providers associated with the facility should be alerted so they can monitor their patients for signs and symptoms clinically compatible with Legionnaires' disease.

Travel Accommodations

1. The facility should notify past and current/future guests when the findings of the epidemiologic investigation*, environmental assessment, or the water sampling results indicate ongoing risk or *Legionella* presence throughout the facility.
    a. Past guests within the last three (3) weeks of notification who may have unrecognized or incubating infections should be notified about possible exposures that may have already occurred.
    b. Current and future guests should be notified, until further notice by LHD, of the potential for exposure prior to or upon arrival so that they should implement recommendations to minimize exposure to aerosolized water or find alternative accommodations if at increased risk for Legionnaires' disease.

c. LHD and NJDOH will provide the facility with template notification letters for past and future guests. The facility must provide a final copy of the letters to the LHD for approval prior to distribution.
d. The local health department will be responsible for following up to ensure that the facility notifies past and present guests.

*When an unusually high number of cases associated with the building are being reported in a short period of time.

Residential Buildings (e.g., apartment complex, independent living, dormitory)

1. If ≥ 2 cases of Legionnaires' disease associated with the facility are identified in a 12-month period:
    a. The facility should immediately notify tenants and staff upon initiation of the public health investigation.
        i. The purpose of this notification is so tenants and staff can minimize their exposure to aerosolized water if at increased risk for Legionnaires' disease and are aware to seek prompt medical attention if symptoms of Legionnaires' disease develop.
    b. The facility should provide an update to tenants and staff when results are received from environmental sampling and to communicate what the next steps are to respond to any positive results.
2. If ≥ 3 cases of Legionnaires' disease associated with the facility are identified but more than 12 months apart (3 cases over extended period):
    a. The facility should consider notifying tenants and staff of the public health investigation, particularly when requesting access to apartments/units to collect environmental samples for *Legionella* testing. Please note that NJDOH may strongly recommend that tenants are notified based on the timeline of cases.
    b. If testing results find detectable levels of *Legionella*, the facility should immediately notify tenants and staff.

RECOMMENDED BEST PRACTICES FOR *LEGIONELLA* PREVENTION AND WATER MANAGEMENT

The following table includes recommended best practices for water management which should be implemented for building water systems even in the absence of disease.

Temperature Control	• Store hot water at or above 140°F (60°C) and ensure hot water in circulation does not fall below 120°F (49°C) or at highest temperature allowable by local regulations and codes. Recirculate hot water continuously, if possible. Install thermostatic mixing valves as close as possible to fixtures to prevent scalding while permitting circulating hot water temperatures above 120°F (49°C). • Store and distribute cold water at temperatures below the favorable range for *Legionella* (77°–113°F, 25–45°C); however, it is important to note that *Legionella* may grow at temperatures as low as 68°F (20°C). • Use pipe insulation to maintain hot and cold-water temperatures throughout the water system.
Routine Cleaning and Maintenance	• Adhere to manufacturer's instructions for maintaining all potable water system components, including periodic inspection of internal surfaces for scale buildup, cleaning, flushing, draining, removal of scale/sediment, and replacement. This includes but is not limited to water heaters, storage tanks, expansion tanks, mixing valves, filters, and conditioners. • Adhere to manufacturer's instructions regarding methods and frequency for cleaning and disinfecting manual and electronic faucets, aerators, and showerheads and hose attachments. Immediately clean or replace aerators and showerheads with visible biofilm and scale.
Routine Flushing	• Flush water at points of use (e.g., sink tanks, showerheads, tubs) not in routine use or which experience low water flow at least once per week to prevent water stagnation (twice per week for healthcare facilities). This includes areas that are unoccupied. ○ Effective flushing can take from a few minutes to greater than an hour, depending on the size of the system, pipe and component size, flow rates, total volume of water, accumulated sediment, and deposits to be flushed.
Piping Design	• Establish a dead leg elimination and prevention plan. Dead legs should be identified and eliminated, or where unavoidable, be made as short as possible. Where a dead leg cannot be avoided, it should be regularly flushed to avoid water stagnation. • Recognize that low-flow and mechanically complex fixtures (e.g., electronic sensor faucets) can increase the risk of *Legionella* growth.

Routine Water Quality Parameter Monitoring	• Regularly monitor the water temperature, disinfectant residuals, and pH in the hot and cold potable water distribution systems to determine if water quality parameters are being adequately maintained. ○ Adjust measurement frequency according to the stability of performance indicator values. For example, the measurement frequency should be increased if there is a high degree of measurement variability.
Disclaimer: These recommendations apply to potable and non-potable water systems in human-occupied commercial, institutional, multiunit-residential, and industrial buildings including hotels, office buildings, hospitals and other healthcare facilities, assisted living facilities, schools, universities, commercial buildings, industrial buildings, and centralized systems in multifamily residential buildings. While buildings with noncentralized building water systems and single-family residual buildings are not included, some of the information bay be useful.	

IV. ENVIRONMENTAL INVESTIGATION RESOURCES

Every outbreak investigation is unique and requires careful planning and periodic reassessments to determine the most appropriate response, with consideration given to personnel, resources, or other competing priorities within the local health department. NJDOH is available for consultation and assistance: ICHEE.Water@doh.nj.gov.

LEGIONELLA ENVIRONMENTAL ASSESSMENT FORM

This assessment form enables public health officials to gain a thorough understanding of a facility's water systems and aerosolizing devices and assists facility management with minimizing the risk of Legionnaires' disease.

During an outbreak investigation, the Local Health Department will provide the facility with the *Legionella* Environmental Assessment Form so that the facility may gather pertinent information and return the completed form to the Local Health Department prior to the onsite environmental assessment. In addition, the Local Health Department will request the following records as applicable: Water Management Program, floors plans, water testing results (e.g., water quality parameters such as temperature, pH, disinfectant residual, *Legionella*), and maintenance log of cooling towers, hot tubs, and decorative fountains.

During the onsite environmental assessment, the *Legionella* Investigative Team will verify the responses on the completed form. It is important that someone from the facility who is knowledgeable of the building water system(s) is present for the site visit.

NJHealth
New Jersey Department of Health
Communicable Disease Service

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

9. **Are any occupant rooms taken out of service during specific parts of the year, e.g., low season?**

   ❑ YES ❑ NO

   If YES, which rooms? _____

10. **Did the facility recently experience (last 12 months) a period of prolonged, reduced occupancy, or a building closure?**

    ❑ YES ❑ NO

    If YES, which rooms/buildings? _____

11. **Describe any interventions taken as a result (e.g., flushing, hyperchlorination):**

    _____
    _____
    _____

12. **Has there been any recent (last 6 months) or ongoing major construction on or around the facility premises?**

    ❑ YES ➔ If yes, also complete Appendix B.

    ❑ NO

13. **Has this facility been associated with a previous case of Legionnaires' disease?**

    ❑ YES

    ❑ NO

    If YES, please describe number of cases, dates, source if found, and any interventions (immediate and long-term) to prevent recurrence:

    _____
    _____
    _____
    _____
    _____

14. **Does the facility have a Water Management Program, water safety plan, or *Legionella* prevention program?**

    ❑ YES ➔ If yes, include a copy

    ❑ NO

    If YES, does the facility ever test for *Legionella* in water samples?

    ❑ YES ➔ If yes, include copies of results

    ❑ NO

15. Describe each building that shares water or air systems, including the main facility

Building Name (List main facility case-patient was exposed to first)	**Original Construction** Year Completed	**Later Construction** (Renovation, expansion) From/To or "N/A"	**Stories or Levels** #	**Occupancy Rate** (%)	**Daily Census** (Average) #/day	**Use** (List all types of uses)
1.				Low Period: High Period:		
2.				Low Period: High Period:		
3.				Low Period: High Period:		
4.				Low Period: High Period:		
5.				Low Period: High Period:		

Water Supply Source

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

❑ Public Water System, if YES:

Name of supplier _____

How is the municipal water disinfected? ❑ Chlorine ❑ Monochloramine ❑ Other _____

Has treatment of municipal water changed in the past year? ❑ YES ❑ NO

If YES, specify _____

❑ Private well, if YES:

How is the well water disinfected? ❑ Chlorine ❑ Not disinfected ❑ Other _____

Is the water filtered onsite? ❑ YES ❑ NO ❑ Other _____

17. Have there been any pressure drops, boil water advisories, or water disruptions (e.g., water main break) to the facility in the past 6 months (in public water system off premise and/or on facility property)?

❑ YES ❑ NO

If YES, describe what happened and which buildings or parts of buildings were affected:

_____

_____

_____

_____

18. Does the facility monitor incoming water parameters (e.g., residual disinfectant, temperature, pH)?

❑ YES ➔ If yes, include copies of the logs

❑ NO

Premise Plumbing System

19. Are cisterns and/or water storage holding tanks used to store cold potable water?

❑ YES ❑ NO

20. Are there water softeners used on incoming water? ❑ YES ❑ NO

21. Are water filters used on incoming water (e.g., point-of-entry carbon filter)? ❑ YES ❑ NO

***22.* Are expansion tanks used on the building's potable water system?** ❑ YES ❑ NO

If YES, how many? _____

23. How is the hot water system configured to deliver hot water to each building?

Building Name	Type of System (e.g., instantaneous heater, water heater with a storage tank, solar heating)	Name of System (e.g., Boiler #1, Loop #1)	Date of Installation	Total Storage Capacity (Gallons)	Temperature Set-Point of Water Heater (°F)	Centralized Thermostatic Mixing Valves Installed? (prior to delivering water to points of use) (yes/no)	Hot Water Recirculating System? (yes/no)	Distal Outlet or Return Line Temperature (°F)	Areas Served (e.g., rooms, floors)

24. What is the maximum hot water temperature at the point of delivery permitted by state / local regulations? _____ °F

25. Are hot water temperatures ever measured by the facility at the points of use?

❑ YES ➔ If yes, attach copies of the temperature logs

If YES, what is the average documented hot water temperature: _____

If YES, what is the range of documented hot water temperatures: _____

❑ NO

26. Are cold water temperatures ever measured by the facility at the *points of use*?

❑ YES ➔ If yes, attach copies of the temperature logs

If YES, what is the average documented cold water temperature: _____

If YES, what is the range of documented cold water temperatures: _____

If YES, what is the typical cold water temperature measured in the summer? _____

❑ NO

27. Are the potable water disinfectant levels (e.g., chlorine) ever measured by the facility at the points of use?

❑ YES ➔ If yes, obtain copies of the logs

If YES, how often are they measured?

If YES, list the range of disinfectant residuals:

Summer: _____ Winter: _____

❑ NO

28. Does the facility have a supplemental disinfection system for long term control of *Legionella* or other microorganisms?

❑ YES ➔ If yes, obtain SOPs for routine use and maintenance as well as maintenance logs and records of disinfection levels, and complete the below table

❑ NO

Buildings with supplemental disinfection (specify hot, cold, or both)	Type of system (e.g., chlorine, chlorine dioxide, copper-silver)	Date Installed	Maintenance Personnel and Contact Information (in-house or consultant)

29. Does the facility have any electronic or sensor faucets at points of use?

❑ YES ❑ NO

If YES, where:

_____

30. Does the facility have any metering faucets or shower systems (e.g., timer, push button design)?

❑ YES ❑ NO

If YES, where:

_____

31. Does the facility have any water filters installed at points of use (e.g., carbon filters, 0.2-micron biological filters)?

If YES, where:

_____

32. Does the facility have ice machines?

❑ YES ❑ NO

If YES, list location with facility, manufacturer, model number, cleaning procedures and frequency:

_____
_____
_____
_____

33. Please describe any maintenance (either routine or emergency) carried out on the potable water system and its components (e.g., hot water tanks, mixing valves, showerheads, etc.) in the past year. Provide records/SOPs if available.

_____
_____
_____
_____
_____

Emergency Water Systems

34. Does the facility have emergency fire protection system?

❑ YES → ❑ Wet ❑ Dry

❑ NO → If no, skip to Q.35

If YES, is the system fed by its own main or does it branch off the same main as the potable water system?

❑ Separate main from potable water

❑ Shared main as potable water system

If SHARED, describe back flow prevention (e.g., reduce pressure zone) _____

35. Does the facility have eye wash stations (connected to the potable water) or safety showers?

❑ YES ❑ NO

If YES, how often and when was the last test? _____

Facility Devices Overview

36. Are there any cooling towers or evaporative condensers on the facility premises?

❑ YES ➔ If yes, also complete Appendix C.

❑ NO

37. Are there any hot tubs, whirlpool spas, or hydrotherapy spas on the facility premises?

❑ YES ➔ If yes, also complete Appendix D.

❑ NO

38. Are there any decorative fountains, misters, water features, etc. on the facility premises?

❑ YES ➔ If yes, also complete Appendix E.

❑ NO

39. Does the facility have centralized humidification (e.g., on air-handling units) or any room humidifiers?

❑ YES ❑ NO

If YES, describe their location and operation:

_____

_____

_____

40. Does the facility have a landscape irrigation or sprinkler system?

❑ YES ❑ NO

If YES, describe their location and operation, including backflow prevention:

_____

_____

_____

Appendix A. Healthcare Facilities

Note: Complete for all healthcare facilities, including but not limited to hospitals, long term care/rehab/assisted living/skilled nursing facilities, or clinics.

1. **Type of healthcare facility (check all that apply):**
   - ❒ Acute care hospital
     If YES, does the facility have a solid organ or bone marrow transplant program? ❑ YES ❑ NO
   - ❒ Long term care facility (i.e., nursing home, long term acute care)
   - ❒ Rehabilitation facility or other skilled nursing care
   - ❒ Assisted living facility
   - ❒ Outpatient surgical center
   - ❒ Other outpatient clinic (describe): _____
   - ❒ Other healthcare facility (describe): _____

2. **Number of beds:** _____

3. **Are ice machines used to provide ice for patient consumption or processing medical equipment?**
   ❑ YES ❑ NO

   If YES, list manufacturer and model or catalog number _____

4. **Does this facility use respiratory therapy equipment** (e.g., CPAP, bronchoscopes, heater-cooler units)?
   ❑ YES ❑ NO

   If YES, describe (source of water used in devices, source of water used to clean devices, and cleaning and drying procedures): _____
   _____
   _____

5. Has this facility experienced previous Legionnaires' disease cases that were "possibly" or "presumptively" facility-acquired? *Note: "Possible" healthcare-acquired disease is defined as a case that spent a portion of the 14 days before date of symptom onset in one or more healthcare facilities, but does not meet the criteria for presumptive healthcare-associated Legionnaires' disease. "Presumptive" healthcare-acquired disease is defined as a case with greater than or equal to 10 days of continuous stay at a healthcare facility during the 14 days before onset of symptoms.*
   ❑ YES ❑ NO
   If YES, describe (e.g., number of cases, dates): _____
   _____
   _____

Appendix B. Recent or Ongoing Major Construction (past 6 months)

1. **Describe in general the extent of the construction including location and start/end dates (or estimated completion date).**

   _____
   _____
   _____
   _____

2. **Was temporary water service provided to the new construction area** (i.e., separate meter)?
   ❑ YES ❑ NO
   If YES, describe: _____

3. **Has jack-hammering or pile-driving been used during the construction process?**
   ❑ YES ❑ NO
   If YES, list dates and locations: _____

4. **Have there been disruptions or changes to the existing potable water system during the construction?**
   ❑ YES ❑ NO
   If YES, describe: _____
   _____
   _____

5. **Has the potable water changed in terms of taste or color during the construction process?**
   ❑ YES ❑ NO
   If YES, describe the changes including when they started and ended: _____
   _____
   _____

6. **Is there a standard operating procedure (SOP) for shutting down, isolating, and refilling/flushing for water service areas that have been subjected to repair and/or construction interruptions?**
   ❑ YES ❑ NO
   If YES, briefly describe the steps used in the SOP (attach a copy if possible): _____
   _____
   _____

7. **Was the potable water system flushed before occupying any new building space?**
   ❑ YES ❑ NO ❑ NOT APPLICABLE
   If YES, what period of time passed between flushing and when the building was occupied? _____
   _____

Appendix C. Cooling Towers

General Cooling Tower Disinfection, Operation and Maintenance Characteristics

1. **Disinfectant used in cooling tower(s)?**
   ❑ YES
   ❑ NO

   If YES, what type of disinfectant is used?
   Oxidizing ❑ YES ❑ NO
   Non-oxidizing ❑ YES ❑ NO
   List name(s) of disinfectant used (e.g., chlorine, bromine) _____

2. **Target range in which the disinfectant is regularly maintained**: _____

3. **Type of disinfectant dosing system?**
   ❑ Hand fed ❑ Automatic dosing by chemical controllers ❑ Not Applicable

4. **Schedule of adding disinfectant** (e.g., daily, weekly, as needed): _____

5. **Are disinfectant levels monitored?**
   ❑ YES → If YES, how often and by whom? _____
   ❑ NO

6. **Scale and/or corrosion inhibitors used?**
   ❑ YES
   ❑ NO

7. **Type of scale/corrosion inhibitor dosing system?**
   ❑ Hand fed ❑ Automatic dosing by chemical controllers ❑ Not Applicable

8. **Schedule of adding scale and corrosion inhibitors** (e.g., daily, weekly, as needed): _____

9. **Are chemical metering pumps properly maintained and in good condition?** ❑ YES ❑ NO

10. **Is there an adequate supply (at least 30 days) of chemicals on-hand?** ❑ YES ❑ NO

11. **Is *Legionella* testing ever performed on the cooling tower?**
    ❑ YES → If YES, how often and by whom: _____

12. Is the cooling tower turned off at any time?

❑ YES → If YES, describe: _____

❑ NO

13. **Are there start-up and shut-down procedures for the cooling tower?** ❑ YES ❑ NO

If YES, describe: _____

_____

_____

_____

14. **When was the cooling tower last cleaned?** _____

15. **At what frequency are the scheduled cleanings and what do they include?** _____

_____

_____

_____

16. **Were there any recent (last 6 months) special (non-routine) treatments, maintenance, or repairs to the cooling tower(s)?** ❑ YES ❑ NO

Specify tower ID(s), date, and actions taken: _____

_____

_____

Appendix D. Hot Tubs, Whirlpool Spas, and Hydrotherapy Spas

1. **Who operates and maintains the hot tub (e.g., on-site facilities management, name of outside contractor)? Describe their role and frequency of maintenance:** _____
   _____
   _____
   _____

2. **Describe each hot tub and how it is maintained:**

Hot Tub Questions	Hot Tub #1	Hot Tub #2
Hot tub descriptor/location (e.g., main, private room #)		
Indoor or outdoor		
Max. bather load		
Filter type (e.g., sand, diatomaceous earth, cartridge)		
Date filter was last changed		
Frequency of filter/filter media replacement		
Date of last filter backwash		
Frequency of filter backwash		
Compensation tank present?		
Type of disinfectant used (Chemical name, formulation, and amount used)		
Current measured disinfectant level (e.g., free chlorine, bromine) (ppm)		
Current measured pH		
Method used for adding disinfectant (e.g., automatic feeder, by hand)		
Method used for monitoring and maintaining disinfectant and pH levels (e.g., automatic controllers)		
Date last drained and scrubbed		
Water replacement frequency (e.g., complete drain and refill)		

Appendix E. Other Water Devices

Complete for decorative fountains, water walls, recreational misters, etc. This can also be modified for industrial use water.

Water Feature Questions	Feature #1	Feature #2
Descriptor/Location (e.g., lobby fountain, cabana misters)		
Is the device equipped with a filter? If so, record type.		
Indoor or outdoor		
Source of water		
Operates continuously (C) or intermittently (I)		
Presence of a heat source? (e.g., incandescent lighting)		
Current Water Temperature		
Type of disinfectant used (include chemical name, formulation, and amount used)		
Current measured disinfectant level (e.g., free chlorine, bromine) (ppm)		
Current measured pH		
Is there a maintenance protocol?		
Date last cleaned and/or flushed		
Operating as designed and in good repair? If no, describe issues.		

ENVIRONMENTAL *LEGIONELLA* SAMPLING DATA SHEET

Introduction

This is a supplemental tool to collect data during environmental *Legionella* sampling as part of an outbreak investigation. The sample collector must adhere to the New Jersey Department of Health's Environmental Sampling and Testing Guidance when collecting environmental samples for *Legionella* testing. The below instructions are for recording data on the Sampling Data Sheet. The completed Sampling Data Sheet should be submitted to the Local Health Department in addition to the chain of custody and original test result report(s) provided by the laboratory.

Access

The Environmental *Legionella* Sampling Data Sheet is available in excel format at: https://www.nj.gov/health/cd/documents/topics/legion/Legionella_Environmental_Data_Collection_Sheet.xlsx

Instructions

1. Review the Data Dictionary to become familiar with the different types of variables collected in this database.
2. Assign a unique sample identification number for each sample. Labels with pre-assigned IDs may be printed ahead of time for the sample bottles.
3. Complete the sample location variables, including the floor number, room number or area, and fixture type (e.g., sink, showerhead, water heater drain valve). Assign a unique sample location ID to this specific sample location.
4. Specify whether the sample is potable hot water, potable cold water, non-potable water, or a biofilm swab.
5. Specify the sample volume. For investigative sampling in response to a case of Legionnaires' disease, the sample volume must be 1000 mL.
6. Specify whether the sample was a first-draw or post-flush water sample (or non-applicable for biofilm swabs). All potable hot water samples should be first-draw unless otherwise directed by public health authorities.
7. Record first-draw water quality parameters, including temperature, pH, and disinfectant residual (e.g., free chlorine). Use a calibrated digital colorimeter for measuring disinfectant residual. Test kits and color wheels are not recommended for potable water samples.
8. Record the time (in seconds) it takes for the hot water to reach its maximum temperature. Further investigate locations where it takes more than a minute for the water to reach its maximum temperature.
9. Record post-flush water quality parameters, including temperature, pH, and disinfectant residual (e.g., free chlorine).

10. Indicate whether the *Legionella* culture test result was positive (*Legionella* detected) or negative (*Legionella* not detected). In some instances, "pending" or "not tested" are appropriate responses (for example, if a sample was damaged in transit).
11. If the sample was positive, specify the *Legionella* species and serogroup identified.
12. Record the *Legionella* concentration in colony forming units (CFU) per milliliter (mL).
13. Document any notes or observations regarding the sample. For example, if it was a sink in a room that was vacant for an extended period of time, or if there was discoloration of the water.
14. If *Legionella* is detected, or if water quality parameters fall outside acceptable ranges, take corrective actions to investigate the root cause. Document the control measures implemented to address the *Legionella* detection and/or the out-of-range water quality parameters.

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.
5. **Experience with Environmental Sampling:** The consultant should be able to collect environmental samples for *Legionella* testing in adherence with NJDOH's environmental sampling guidance.
6. **Experience with Remediation:** The consultant should have a proven track record of successfully remediating *Legionella* from building water systems, demonstrated by

elimination of *Legionella* without rebounding. This includes selecting the right disinfectants (chemicals), determining proper concentrations, and ensuring safety for building occupants.

7. **Familiarity with Testing Laboratory Requirements:** The consultant should understand the requirements for *Legionella* testing laboratories, including accreditation standards and sample handling procedures.
8. **Water Management Program Expertise:** The consultant should have experience in creating Water Management Programs tailored to specific facilities, following industry standards and guidelines such as ASHRAE Standard 188 and Guideline 12.
9. **Up-to-date Knowledge:** The consultant should stay current with CDC and NJDOH guidelines, building codes, regulations, and industry standards and best practices.

Roles and Responsibilities During an Outbreak Investigation

1. **Expert Support:** Provide guidance to facility management according to NJDOH guidelines throughout the investigation.
2. **Coordination:** Help manage communication with public health authorities and other relevant parties. This may involve coordinating with the Water Management Program Team, including facility staff, maintenance workers, and vendors.
3. **Risk Assessment and Hazard Analysis:** Evaluate building water systems to identify potential *Legionella* sources, such as maintenance issues, poor water quality parameters, improperly maintained water system components, low disinfectant residuals, permissive water temperatures, accumulation of scale and sediment, water stagnation, changes in water pressure, presence of dead-legs, and non-potable water systems' cross-connection controls. Report written findings to facility management.
    a. **Note:** The onsite environmental assessment conducted with local and state public health officials is not a comprehensive risk assessment and should not be considered equivalent to the consultant's risk assessment.
4. **Control Recommendations:** Recommend evidence-based control measures to minimize the risk of *Legionella* growth and transmission.
5. **Infrastructure Advice**: Recommend plumbing or system changes to prevent future issues.
6. **Environmental Sampling**: Develop environmental sampling plans based on plumbing blueprints and collect environmental samples for *Legionella* testing and water quality parameters in adherence to NJDOH guidelines.
7. **Remediation:** Safely perform chemical shock treatments and other remedial actions to reduce *Legionella*.
8. **Post-Remediation Monitoring**: Monitor and test after remediation to confirm effectiveness and recommend further actions if *Legionella* is still detected.
9. **Ensure compliance**: Ensure all procedures for sampling, testing, and remediation meet industry standards and health department recommendations.

10. **Documentation**: Keep detailed records of the investigation, including findings and actions taken.

Note: Larger facilities might already have staff experienced in managing *Legionella* risks in their water systems. In these cases, the consultant's role is to address any gaps in the facility's expertise and provide additional support. It is crucial to involve the consultant throughout the entire investigation for thorough and comprehensive assistance. Depending on your facility's specific needs, you may need to engage multiple consultants to ensure a multidisciplinary approach.

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 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.

a. Bring enough sample bottles per the environmental sampling plan. A 1-liter (1000 mL) sample volume is recommended for investigative sampling, such as during an investigation into a case of Legionnaires' disease. The laboratory should be told the reason for testing.
    i. Note: 250 mL is the minimum recommended sample volume for **routine** environmental sampling of potable water for *Legionella* in the absence of cases. **This is not an acceptable sample volume for investigative sampling**.
b. Ensure that any 0.2-micron point-of-use filters are removed prior to sample collection. Re-install filters immediately after the sample is collected.
c. Each sample should be a first draw, hot water sample, unless otherwise specified.
d. If the sample bottles are not pre-treated with sodium thiosulfate, then 0.5 mL of 0.1N sodium thiosulfate must be added to each 1000 mL bottle to neutralize residual disinfectants like chlorine.
e. Biofilm swab collection is recommended for outlets in visible poor condition.
f. Label the bottle with a unique location identifier. Record the type and location of the sample on the Sample Data Sheet and chain of custody.
    i. For example, "guest room 140 bathroom sink hot"
g. Samples should be transported to the laboratory in insulated containers as soon as possible after the time of collection, preferably within 24 hours. If the time must exceed 48 hours, consult with the laboratory for instructions.

3. Measuring Water Quality Parameters

a. For each sampling location, measure pre-flush and post-flush water quality parameters (WQPs), including temperature, disinfectant residual, and pH.
    i. To collect post-flush WQPs, run the water until the temperature stabilizes (may be hot or cold water depending on the sample being collected). Collect 100-300 mL of water in a separate bottle designated only for measuring WQPs (the same bottle can be used for measuring WQPs at each sampling location). Record all measured data on the sample data sheet (see link below).
    ii. Record how long it takes for each sampling location to reach its maximum water temperature. Further investigate locations where it takes more than a minute for the water to reach its maximum temperature.
    iii. Please refer to NJDOH's Environmental Sampling Data Sheet as an example of information that should be collected.

4. **Processing and Analyzing Environmental Samples**

    a. Samples must be analyzed at a CDC ELITE member laboratory that is accredited by a regional, national, or international accrediting body and can retain isolates of *Legionella*-positive samples.
    b. The laboratory must process the entire volume for the type of sample collected and the test conducted. For instance, collecting and processing a full liter (1000 mL) for culture is recommended for potable water.
    c. Each sample must be analyzed using traditional *Legionella* culture methods, including enumeration and species/serogroup identification.
    d. The limit of detection (LOD) for *Legionella* culture testing for potable water must be less than or equal to 0.1 colony forming units per milliliter (CFU/mL) and for non-potable LOD must be less than or equal to 5 CFU/mL.

Health and Safety Considerations

Notify the facility in advance to turn off aerosol-generating devices (without draining or disinfecting) to reduce risk to the sampling team. Individuals at high risk for Legionnaires' disease should not accompany the team.

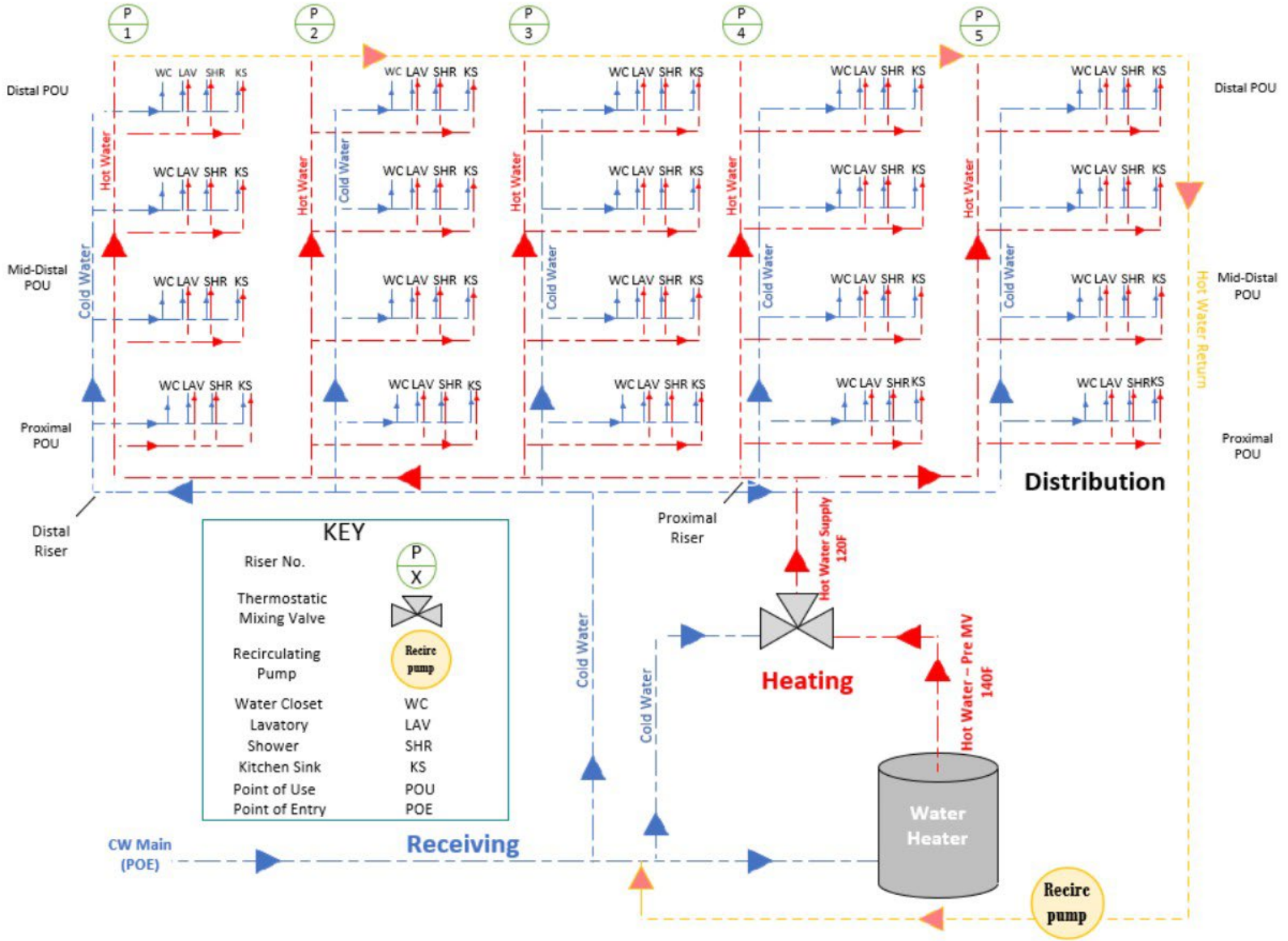
Optional Personal Protective Equipment (PPE):

- **Gloves:** Useful for handling heavily contaminated sites like whirlpool spa filters.
- **Respirators:** A half-face respirator with an N95 filter is recommended for:
    - Sampling cooling towers with active fans, or
    - Enclosed spaces with active aerosol-generating devices.

Ensure respirators are used per OSHA standards (29 CFR 1910.134), including fit testing, training, and medical clearance. For more on N95 respirators, visit the NIOSH website.

Other Hazards: Common hazards include slips, falls, cuts from corroded equipment, and electrical shocks. Wear non-slip shoes, goggles, nitrile gloves, and a hard hat may be appropriate when entering a cooling tower. Avoid loose clothing and be cautious of cleaning chemicals and stinging insects (e.g., wasps, bees) that may be in or near the cooling tower.

Figure 1. Example of Plumbing Riser Diagram



Utilizing Riser Diagrams to Develop a Sampling Plan

Riser diagrams visually show how cold water enters the building and is distributed throughout the building to point of use outlets. For buildings with a centralized hot water system, some of the cold water goes to a centralized water heater to be heated. The hot water is then distributed throughout the building. Buildings with multiple floors typically have vertical pipes (risers) that serve a “stack” of rooms. The hot water is recirculated throughout the system by a pump and returned to the water heater to be re-heated.

It is important to identify sample locations from risers that are representative of the building water system (including risers that are proximal, mid, and distal from the centralized water heater). Additionally, select locations on each individual vertical riser to ensure various levels/floors of the building are represented (e.g., rooms that are proximal, mid, and distal on a riser line).

Table 1. Potential Sampling Locations

Sample Location	Sample Type	Sampling Description
Incoming cold water	1L bulk water	A flushed water sample collected at a location closest to the water meter. Flushing duration is dependent on the length of the service line and water usage patterns.
All hot water and cold water storage tanks	1L bulk water	A sample from the drain valve at or near the bottom of each tank
All centralized water heaters	1L bulk water	A sample from the drain valve at or near the bottom of water heater
All expansion and pressure tanks for potable water	1L bulk water	Collect a first draw sample if tap or nearby sampling port is available
All hot water return lines	1L bulk water	Collect a first draw sample closest to recirculatory pump prior to the return water blending with cold, hot, or both cold and hot water
Water softeners, special filters, and disinfection systems	1L bulk water	Collect a sample before and/or after these processes
All fixtures in case rooms	1L bulk water	Hot water – first draw
All fixtures in case rooms	1L bulk water	Cold water – first draw
All other areas the case-patient may have been exposed to (e.g., salon sink, common shower room)	1L bulk water	Hot water – first draw
Representative number of point-of-use (POU) fixtures from the hot water system (including proximal, mid, and distal locations)	1L bulk water	Hot water – first draw
Cooling tower system	1L bulk water	Collect 1 sample from the collection basin (an area below the tower where cooled water is collected) and 1 sample from the lowest point in the open condenser water circuit.
Hot tubs	1L bulk water	Collect 1-2 samples from the tub and 1 sample per filter
	Biofilm swabs	Number of swabs dependent on size and complexity of water system
Decorative fountains	1L bulk water	Collect 1 sample
	Biofilm swabs	Number of swabs dependent on size and complexity of water system
Note: Additional bulk water or biofilm swab samples may be recommended based on the condition, size, and complexity of water systems and devices.		

BUILDING WATER SYSTEM REMEDIATION GUIDANCE

A chemical shock remediation is a remedial treatment to kill *Legionella* in hot or cold potable water systems, using chemical disinfectants for a relatively short period frequently at concentrations well above maximum levels permitted for potable water. Examples include chlorine, chlorine dioxide, and monochloramine. The New Jersey Department of Health may recommend a chemical shock remediation in a facility associated with a confirmed Legionnaires' disease case or outbreak, or a facility that has positive environmental results indicating the presence of *Legionella* bacteria. Please note that NJDOH does not recommend the installation of a supplemental disinfection system in lieu of a chemical shock remediation.

There is no accepted standard for performing a whole building water system chemical shock remediation for existing buildings. The following guidance is meant to be a general outline of what a chemical shock procedure may look like; however, because every building water system is unique (e.g., pipe materials, configuration, water chemistry), chemical shock remediation plans will need to be tailored accordingly. It is strongly recommended that building owners consult with a licensed water treatment professional with *Legionella* remediation experience. The consultant should be able to demonstrate that they have conducted successful remediations. Be aware that poorly performed remediations will result in the rebound of *Legionella* and the need for repeat remediation procedures.

Safety Considerations

Prior to the implementation of a chemical shock remediation, the facility should ensure that all building occupants (e.g., residents, staff, visitors) are informed of the remediation to facilitate safe implementation. Ensure proper worker safety protocols are in place and availability of personal proper protective equipment (PPE) to facilitate a safe implementation of shock remediation. All remediation activities must be performed by a water quality consultant or water treatment professional with experience in building water system remediation.

Building occupants may be adversely affected by disinfectant from running water at sinks and showers. Precautions must be taken during and after the remediation to prevent exposure to water with elevated levels of disinfectant. Ensure proper ventilation throughout the remediation procedure. Plumbing fittings and drain hose (garden hose) attachments can be used as an extension apparatus to move flushed treated water directly to the waste drain pipes at point of use faucet/showerhead to minimize splashing and/or preventing aerosolization of treated water. If drain cover cannot be removed, cover the drain with towel or place the hose in a bucket to allow water to gently spill over into the drain waste pipe. Once the target disinfectant residual concentration has been achieved for the specified contact time, fitting and drain hoses may be removed after post-remediation flushing has been performed to ensure disinfectant residual concentration is below the maximum allowable levels per SDWA standards.

For healthcare facilities, it is important to consider the implications of *Legionella* control and remediation strategies on special use water systems (e.g., hemodialysis, laboratory) within the building. For example, chemical disinfectants may result in the formation of disinfection byproducts at concentrations that may be toxic to patients on hemodialysis. Accordingly, the impact of control and remediation strategies must account for potential toxicity, methods for removal of the chemical agent and byproducts from the special use water system and the availability of assay methods to measure the chemical agent and byproducts for assuring patient safety. Employees responsible for the oversight of special use water systems are to be consulted during the development and implementation of water treatment strategies for *Legionella* and promptly notified of any changes in treatment procedure.

Facility Preparation

1. Check the testing records to ensure the backflow preventer devices (where the water enters the building) has been tested within the last year or have it tested for proper function in accordance with the applicable plumbing/building codes.
2. Gather all relevant building and mechanical drawing. Include original and as-built drawing, if possible.
3. Determine an effective treatment mechanism to ensure disinfectant is dispersed throughout the plumbing water system equipment, components, devices, and distribution piping based on building drawings.
4. Determine the potable building water distribution system(s) that will be treated. Treatment may consist of the hot-water system, the cold-water system, or both hot water and cold-water systems.
5. Identify and eliminate all dead legs in the system (i.e., capped pipes). If a dead leg cannot be eliminated, install a shut off valve as close as possible to the active pipe run and drain the plumbing beyond the shut off valve. In cases where dead leg cannot be isolated from the active pipe run, plumbing design modifications must be considered for incorporating means for flushing the dead leg to allow freshwater flow.
6. Identify all distal points including sinks, showers, toilets, hose bibs, washing machines, drinking water fountains, slop sinks, eye wash stations, and if treating the cold-water side, other water using devices such as ice machines, coffee machines, and dish washers that will need to be operated to ensure disinfectant reaches that point.
7. Identify all expansion tanks so that they may be addressed in the treatment process.
8. Determine effective disinfectant concentration (C), and contact time (T), commonly expressed as C (mg/L) x T (min) or CT value.
9. Verify the determined chemical dosing concentration is compatible with premise plumbing water system components and materials.

10. Determine the required treatment installation processes including disinfectant inject point(s) into the system (e.g., must be located downstream of the backflow prevention devices to prevent cross contamination).
11. Verify that the potable water system can maintain elevated levels of disinfectant.
12. Verify the requirements of monitoring any disinfection byproducts associated with the selected treatment.
13. Ensure that drains are functional and can handle expected flows without overflowing.
14. Ensure that building personnel with keys to ALL rooms and closets with taps are on-site and available to open locked doors and remain on-site until the remediation is completed.
15. Ensure that a plumber is on-site and available to conduct plumbing repairs that may needed in the event of water leaks, broken pipes, etc.
16. Ensure proper lockout/tagout mechanisms are in place to prevent inadvertent use of water by occupants and residents during the remediation procedures.
17. Consult with a licensed plumber/water treatment professional for preparation of the above listed items. Ensure the individual responsible for planning, installation, and implementation of the remedial treatment has the technical skills and experience to complete the remedial treatment successfully and safely.

Chemical Shock Remediation Procedure

1. Notify all building occupants (e.g., residents, staff, guests, visitors) and ensure they understand that the water is not safe for use.
2. Remove all faucet aerators, showerheads, point of use filters, and hoses (disinfect removed components in accordance with manufacture's instruction, if you plan to reinstall).
3. Post "Out-of-Service" with appropriate hazard warning signs on all affected areas, taps and outlets.
4. Bring the water heating equipment offline.
5. Drain, clean, and disinfect water heaters and water storage tanks to remove sediment and scale. Follow manufacturer's instructions.
6. Introduce chemical disinfectant into the system.
7. Draw treated water through all the outlets in the system. Run the water at each location until target concentration is achieved. Ensure disinfectant residual are measured with a colorimeter. Test strips are not acceptable.
8. Measure disinfectant residual periodically during the remediation process, it is recommended to at periodic measurements are taken at least hourly at each treated outlet. If disinfectant residual begins to drop, run the water at that location to reestablish appropriate disinfectant residual level at that outlet. Outlets experiencing significant drops in disinfectant residual levels should be checked more frequently. If

disinfectant residual level is too low, consideration must be taken extend the contact time to meet the established CT value.

9. Following the required standing time, the system shall be flushed with clean potable water until the disinfectant is purged from the system (chlorine residual throughout the building water system should be about the same as the level entering the building from the water utility or below the SDWA maximum allowable disinfectant levels). Document the final disinfectant residuals.
10. Install new or cleaned/disinfected aerators, showerheads, and hoses. If possible, replace existing aerators with new aerator inserts that inhibit biofilm/bacterial growth, such as “Antimicrobial Laminar Flow Aerator.”
11. Remove warning notices and notify building occupants that system is back in normal operating conditions after verifying that water quality meets the SDWA standards, regulated contaminants are below the maximum allowable levels and water is acceptable for general use.

Follow-up Actions

1. Write a detailed summary report that includes disinfectant dose applied, initial residuals measured, periodic residuals measured, final residuals measures, and contact time. Include any deviations from the planned procedures, root cause analysis and lessons learned.
2. Collect post-remediation environmental samples for *Legionella* culture testing, wait at least 48-72 hours after the building water system has returned to normal operating conditions. Repeat rounds of remediation may be warranted based on how the water system responds to the initial emergency remediation procedure. Refer to “Guidance for Interpreting Water Results Following a Chemical Shock Procedure.”
3. Ensure that an adequate Water Management Program is being implemented.

*Note: If any “dead-leg” pipes are found that were not removed or had isolation valves installed prior to remediation, they **MUST** be addressed within a day or as soon as possible. The bacteria in those pipes could start re-contaminating the system within as little as a week.*

RESPONDING TO POST-REMEDIATION ENVIRONMENTAL *LEGIONELLA* DETECTIONS

When performing a chemical shock remediation in response to a Legionnaires' disease investigation, facilities must conduct post-remediation environmental sampling for *Legionella* to validate the effectiveness of the remediation and long-term prevention strategies. If the root causes of *Legionella* growth are not identified and addressed, *Legionella* can rebound within weeks.

NJDOH recommends conducting post-remediation environmental sampling for *Legionella* 3 to 7 days after the chemical shock remediation has been completed (no sooner than 48 hours after returning to normal operating conditions). Sampling should occur every 2 to 3 weeks. Once there are three consecutive sampling events with no detectable levels of *Legionella*, the facility can transition to monthly sampling after consulting with the Local Health Department. If monthly sampling shows no detectable levels of *Legionella* for three consecutive months, the facility can discontinue investigative sampling.

The identification of any *Legionella* species during post-remediation sampling indicates that the environmental conditions favorable for growth. If *Legionella* is detected in any post-remediation sample—regardless of species or concentration—the facility must immediately re-evaluate their Water Management Program (WMP) **before** the next sampling event. Corrective actions must be taken when any control measure (i.e., action taken to limit the growth and spread of *Legionella*, such as adding disinfectant, or cleaning) is outside of the targeted range. Additionally, new control measures may be needed to address ongoing *Legionella* detections and mitigate hazardous conditions promoting microbial growth in the building water system.

It is expected that facilities implement control measures and/or corrective actions within 14 days of receiving environmental *Legionella* sampling results. **After implementation, wait at least 48 hours for the building water system to stabilize and return to normal operating conditions before the next environmental sampling event.** If *Legionella* persists despite implemented control measures, repeat remediation(s) may be necessary. Any subsequent remediation will reset the sampling schedule.

Fluctuations in water temperature, flow, pressure, quality, or use-patterns can lead to conditions that promote *Legionella* growth. Inadequate residual disinfectant and building water system age can also contribute. It is important to use building schematics of the entire potable water distribution system to create a water quality profile by visually mapping water quality parameters and *Legionella* detection data. This approach helps determine whether issues are localized to specific areas or systemic throughout the entire building water system. The following page outlines common factors contributing to *Legionella* growth.

There are instances when *Legionella* levels increase immediately following a remediation due to disrupted biofilm being flushed out of the system. If this occurs, it is important to thoroughly flush the water from the system and replace it with fresh water to ensure *Legionella* does not recolonize the system. Consider flushing primary water pipes (e.g., risers, branches, horizontal headers) to speed up the delivery of fresh water to points of use. It is beneficial to remove the aerators and showerheads while flushing at points of use, as these devices restrict flow and can become colonized with dislodged biofilm.

Commonly Seen Contributing Factors for *Legionella* Growth

Disclaimer: This list is not exhaustive but provides building owners and operators with an overview of common issues identified in Legionnaires' disease outbreak investigations. Keep in mind that each building's water system is unique. It is the facility's responsibility to mitigate Legionella growth, which may require a licensed plumbing engineer to identify and address contributing factors.

Inadequate Remediation Procedure

- **Dead legs were not removed** prior to the remediation; therefore, the applied disinfectant could not reach all points of the potable water system.
- **Water tanks were not drained, cleaned, flushed, and disinfected** prior to the remediation. Sedimentation at the bottom of tanks can harbor *Legionella* and provide it shelter from high levels of disinfectant.
- **Disinfectant residual was not monitored at all points of use throughout the building distribution**. Disinfectant residual may have dropped below the target value allowing *Legionella* to persist in undetected locations.
- **Showerheads and aerators were not removed** during the process; therefore, dislodged biofilm could not be flushed out of the system.
- **In some instances, the burden of biofilm is so extensive that multiple rounds of remediation are needed to achieve adequate reduction.**

Inadequate Hot and Cold Water Temperatures

- **Hot water temperatures fall within the range that supports *Legionella* growth** (between 68-120°F, with an optimal growth range of 77-113°F). Long-term care facilities often have regulations limiting hot water temperatures to 110°F in resident areas to prevent scalding. In these cases, installing thermostatic mixing valves (TMVs) at points of use, rather than a centralized TMV near the water heater, can reduce *Legionella* risk by maintaining hot water throughout the distribution at or above 120°F. If this isn't possible, alternative control measures may be needed to ensure hot water temperature compliance with federal, state and local regulations.
- **The hot water storage tank has temperature stratification**, where warmer water rises to the top and cooler water remains at the bottom. To ensure adequate temperature control, all stored hot water should be maintained at or above 140°F. Consult with a plumbing engineer to implement strategies for addressing and preventing temperature stratification.
- **Cold water pipes are located near steam pipes, hot water pipes, or other heat sources allowing heat gain and uninsulated hot water pipes are experiencing temperature fluctuations by heat loss.** Installing pipe insulation can help maintain water temperatures outside the range that may support *Legionella* growth due to minimizing heat transfer to or from an external source.
- **A common issue in facilities that use heat trace systems to maintain the temperature of hot water pipes is ensuring the system is installed correctly and functions properly.** Heat trace systems, often found in new construction projects, eliminate the need for a hot water recirculation loop by applying heated electric cables along the pipe to maintain the desired temperature within setpoints.

Inadequate or Inconsistent Disinfectant Residual Levels

- **Water system components are speeding the decay of disinfectant residuals**, such as UV devices, water softeners, carbon filters, and water heaters. Measure the disinfectant residual immediately before and after water is processed by the device to determine which components may be impacting residual levels.
    - Disinfectant residual levels naturally decrease as water moves through the building, but significant fluctuations beyond the expected decline should be investigated to identify the cause.
- **There is insufficient or inconsistent disinfectant in the incoming cold water from the public water system** (if applicable). To obtain an accurate disinfectant residual reading, thoroughly flush the service line before measuring. Ensure you are measuring the appropriate disinfectant type, typically either chlorine or monochloramine. If any issues are identified, contact the water utility company.

Low Water Usage and Low Flow

- **There is increased water age and stagnation due to low water usage and/or flow**, which can negatively affect water quality and promote *Legionella* growth. If it takes longer than 60 seconds for hot water to reach its maximum temperature at points of use, this may signal a localized issue or system imbalance. Additionally, devices such as flow restrictors, electronic faucets, and metered faucets can affect water flow. Routine flushing is essential to mitigate this risk.
- **There are no flushing protocols for the facility's hot and cold water systems, or the existing protocols are ineffective.** Review and update the flushing protocols to ensure a systematic approach for both the hot and cold water systems. Flushing usually involves sequentially opening points of use (e.g., faucets, showers, toilets, drinking fountains, eye wash stations, refrigerators/ice machines, and dishwashers) or flushing in segments based on the plumbing design and water pressure. For example, flushing may begin at the closest point to the water entry and progress to the farthest points. Consult an expert to establish proper protocols, as improper methods can be ineffective or cause damage. The below practices can help optimize flushing protocols.
    - Identify all outlets in the building (e.g., sinks, showers, tubs, janitorial sinks, eyewash stations, etc.) and assess their usage frequency. Ensure that unused or infrequently used outlets are flushed minimally at least once a week (or twice a week for healthcare facilities). Sections of the system with poor water quality may require more frequent flushing.
    - Flush the incoming cold water service line(s) from the water main to the building before flushing the rest of the building’s distribution system.
    - Incorporate flushing of mechanical equipment associated with building water systems such as water heaters, storage tanks, circulatory/booster pumps, water treatment devices, in-line filtration including strainers, and pressure/expansion tanks.
    - If the building has a hot water recirculation system, flushing should also occur near the return point for hot water.
    - Most building water systems have a limited number of larger water pipes that deliver water to smaller diameter piping throughout the building. Flushing these larger pipes, if possible,

will speed up delivery of fresh water to point of use outlets. This step may not be necessary for smaller buildings or simpler water systems.
    - Flushing can be automated using solenoid valves and timers. Consult a plumbing engineer to find appropriate locations for these and a licensed plumber for installation if this is a desired approach.

Potable Water System is Unbalanced

- **Water systems with multiple loops, zones, or risers may need balancing to ensure even distribution throughout the building.** This is typically done with balancing valves during construction. However, over time, unbalanced systems can result from valve malfunctions, plumbing modifications, changes in water use, or calcification, leading to poor water flow, temperature fluctuations, and other water quality issues.
    - Hot water recirculation can be checked by flushing the hot water at outlets without point-of-use thermostatic mixing valves (i.e., double handle fixture with non-tempered hot typically found at utility sinks) and recording the hot water temperature after temperature has stabilized. An unbalanced system may result in inconsistent hot water temperatures during flushing, fluctuating steady-state temperatures, and/or varying times to reach the final steady temperature.
    - If balancing issues are detected, a plumbing engineer or specialized plumber, with the necessary knowledge and tools to accurately calculate and adjust water flow throughout the system using balancing valves, may be needed.
    - Other useful actions include ensuring each pump is functional, installed correctly, and appropriately sized (due to renovations, pumps may become over- or under-sized over the life of a building).

Improper Maintenance of Building Water System Components:

- **Water Softener and Conditioning Systems:** These systems can increase the surface area for biofilm growth and reduce incoming disinfectant residual before water reaches the building distribution system if not properly maintained.
- **Backflow Prevention Devices:** These devices prevent contaminated water from entering the potable water system. Test and inspect regularly per manufacturer's instructions and local codes.
- **Expansion Tanks, Pressure Tanks, and Water Hammer Arrestors:** These devices protect the building water system from excessive pressure shocks and maintain water pressure but can promote water stagnation and foster *Legionella* growth.
- **Water Heaters and Hot Water Storage Tanks:** These water system components are susceptible to sediment buildup and scaling, which can damage elements and foster *Legionella* growth.
- **Thermostatic Mixing Valves:** These valves prevent scalding but can harbor *Legionella*. Follow manufacturer's instructions for maintenance, including cleaning of internal components.
- **Filters (Point of Entry, In-line, Point of Use, and Strainers):** Poorly maintained filters can deplete disinfectant and support *Legionella* growth.
- **Showerheads and Aerators:** These devices can trap debris and minerals, creating conditions for *Legionella* growth.

- **Electronic Faucets:** These complex fixtures may need more frequent flushing and cleaning to prevent *Legionella*.
- **Pumps:** Check pumps regularly to make sure water flows correctly, circulates well, and rotates in order to avoid them sitting idle or in backup mode.

Inadequate Operation of the Supplemental Disinfection System

- **Disinfectant is not being consistently monitored throughout the building's water system**. It is crucial to verify that disinfectant reaches all points of use to maintain its effectiveness.
- **Low or unbalanced water flow is preventing the disinfectant from reaching all points of use in the building's water system.** It is important to review water quality logs and optimize the facility's flushing protocols to ensure the supplemental disinfection system is operating effectively.
- **The supplemental disinfection system is not automated.** CDC recommends that supplemental disinfection systems be automated rather than manual to ensure consistent operation and real time monitoring of controls and disinfectant concentration.
- **Disinfectant levels are inappropriate for the building water system and piping materials**. Overtime, chemical disinfectants can lead to corrosion and pitting of pipes, which creates an environment conducive to biofilm and *Legionella* growth.
- **The supplemental system is not effectively controlling hazardous conditions.** Ensure the water treatment consultant has the technical expertise, skills, and experience to oversee all aspects of the treatment process, including implementation, installation, system start-up, confirmation of post-treatment water chemistry and disinfection byproducts, as well as providing training and ongoing support.

Inadequate Policies, Procedures, and Documentation

- **There is no documentation verifying the implementation of the Water Management Program.** Without proper records, such as maintenance logs, flushing protocols, and water quality monitoring data, it's difficult to identify lapses that could allow *Legionella* growth.
- **Building water system riser diagrams are unavailable.** These diagrams are crucial for understanding how water flows through the building, which helps identify potential problem areas where *Legionella* may proliferate. Hiring an engineer with plumbing design experience may be necessary.
- **Staff do not receive adequate training in *Legionella* prevention and control.** Effective communication and ongoing education are critical to ensuring staff are equipped to recognize and address potential *Legionella* risks.

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.

V. COMMUNICATION RESOURCES

During a Legionnaires' disease outbreak public health officials may need to quickly communicate through multiple channels to different stakeholders. This section contains communication resources to help guide Local Health Departments during a Legionnaires' disease outbreak.

COMMUNICATION GUIDANCE

The Council for State and Territorial Epidemiologists (CSTE) created a Legionnaires' Disease Risk Communication Toolkit that offers comprehensive communication guidance for health officials, including setting- and scenario-specific modules.

NOTIFICATION LETTER TEMPLATES

In notification letters, you want to convey what you know about the situation, who is at risk, and what you are doing to protect against further illness. Consider addressing the following elements when drafting notification letters:

- Who is the intended audience (i.e., hotel/travel accommodation guests, healthcare facility staff, patients and their families, tenants/residents, community members)?
- What do you know about the case exposures (i.e., does the available epidemiologic information point to a given setting or device as the source of exposure)?
    - How many cases have common exposures?
    - What type of exposures are potentially implicated?
    - How tightly clustered in time were the cases?
- What do you know about the environment (i.e., the level of certainty that the implicated setting was the source of exposure)?
    - Have you already performed environmental sampling for *Legionella* testing? Were any samples positive for *Legionella*?
    - Have you already obtained and characterized clinical and environmental isolates to confirm the exposure source?
- What measures have been taken so far or will be taken to prevent further cases (e.g., shutting down/draining hot tubs, remediating the potable hot water system, cleaning, and disinfecting cooling tower systems and/or other misting devices, water use restrictions, installation of point-of-use filters)?
- How can those at risk protect themselves (i.e., who is at increased risk, how is it spread and treated, where can more information be found [include contact information for the appropriate public health jurisdiction])?
- What are the symptoms that people should monitor for and over what time frame (e.g., monitor for respiratory symptoms for 14 days after most recent potential exposure? If symptoms develop, seek care, and speak with a clinician about *Legionella*).

Following are customizable letter templates for use during Legionnaires' disease outbreaks. Public health officials can adapt these templates according to individual circumstances, preferences, and available resources.

Healthcare Facilities

- Notification letter template to healthcare facility staff regarding a single possible healthcare-associated Legionnaires' disease case
- Notification letter template to healthcare facility staff regarding a single presumptive healthcare-associated Legionnaires' disease case, when a full investigation is warranted
- Notification letter template to healthcare facility staff regarding two or more possible healthcare-associated Legionnaires' disease cases within 12 months, when a full investigation is warranted

Non-Healthcare Facilities

- Notification letter template to a facility (non-healthcare) associated with two or more cases of Legionnaires' disease within 12 months, when a full investigation is warranted

Hotels

- Notification letter template to hotel management regarding a single Legionnaires' disease case possibly associated with a travel accommodation
- Notification letter template to recent hotel/travel accommodation guests regarding a Legionnaires' disease outbreak investigation (post-exposure)
- Notification letter template to incoming hotel/travel accommodation guests regarding a Legionnaires' disease outbreak investigation (pre-exposure)

Apartment Building

- Notification letter template to building owner/manager regarding a single Legionnaires' disease case possibly associated with the building
- Notification letter template to tenants regarding a Legionnaires' disease outbreak investigation and pending environmental sampling results
- Notification letter template to tenants regarding a Legionnaires' disease outbreak investigation and positive environmental sampling results

Fact Sheets

You may choose to attach or include these fact sheets with notification letters.

- Legionnaires' Disease
  This fact sheet describes what Legionnaires' disease is, its symptoms, how it's spread and treated, and who is at increased risk.
- What Clinicians Need to Know about Legionnaires' Disease
  This fact sheet describes diagnosis, testing, treatment, reporting, etiology, transmission, risk factors, common sources of infection, and prevention of Legionnaires' disease.

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

[Insert date]

Dear [Name of facility administrator, medical director, or infection preventionist]:

On [date], the [local health department] received a report of a patient at [facility name] who was diagnosed with a laboratory-confirmed cased of Legionnaires' disease (LD). The patient meets the criteria for possible healthcare-associated LD, having spent time at your facility within 14 days before illness onset. At this time, we are not aware of any other LD cases associated with your facility in the past 12 months. However, if a second case is identified within a 12-month period, the local and state health departments will conduct further investigation to determine whether your facility may be the source of *Legionella* exposure. For now, this letter is being provided for your information only.

Given the identification of this possible healthcare-associated LD case, there is concern that your facility's water systems may be at risk for *Legionella* growth and transmission. *Legionella* can persist unless proper steps are taken to prevent the growth of bacteria.

We strongly encourage you to review your water management practices to reduce the risk of *Legionella* growth and transmission. The American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) has developed guidance documents for managing *Legionella* risk in building water systems, including Standard 188 ("Legionellosis: Risk Management for Building Water Systems") and Guideline 12 ("Minimizing the Risk of Legionellosis Associated with Building Water Systems"). These resources are available at www.ashrae.org.

Additionally, please review the following recommendations to minimize *Legionella* risk in your facility:

- **Water Management Programs** are now a standard for healthcare facilities. More information is available at https://www.cdc.gov/control-legionella/php/toolkit/wmp-toolkit.html.
- **Centers for Medicare and Medicaid Services (CMS)** requires healthcare facilities to have water management policies in place to reduce the risk of *Legionella* and other opportunistic pathogens. For more information, visit https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/SurveyCertificationGenInfo/Downloads/Survey-and-Cert-Letter-17-30.pdf.
- **Clinicians should be reminded to test patients** with healthcare-associated pneumonia for LD. The preferred diagnostic tests are culture of lower respiratory specimens on selective media in addition to the *Legionella* urinary antigen test. As a supplement to culture, PCR of lower respiratory specimens can also detect other *Legionella* species and serogroups. A fact sheet for clinicians is available at: https://www.cdc.gov/legionella/downloads/fs-legionella-clinicians.pdf.

Please inform [LHD name] immediately if you learn of other potential LD diagnoses among patients, staff, or visitors in your facility. If you have any questions regarding this notice, please do not hesitate to contact [name and contact details for LHD]. Thank you for your time and attention.

Sincerely,

[LHD POC name and contact details]

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]

References

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

LHD Template: Notification Letter to a Healthcare Facility Regarding Two or More Possible Healthcare-Associated Cases of Legionnaires' Disease within 12 Months

[Insert date]

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

The [LHD] has been notified that [# number] [residents/patients] of [facility name] have been diagnosed with Legionnaires' disease (LD), respectively in [enter timeframe]. These cases meet the public health criteria for possible healthcare-associated Legionnaires' disease given that they spent a portion of their incubation period (2-14 days before onset of symptoms) within your facility. The identification of two or more possible healthcare-associated LD cases within a 12 month period is considered an outbreak and 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

3. 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
4. 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

LHD Template: Notification Letter to a Facility Associated with Two or More Cases of Legionnaires' Disease within 12 Months (*non-healthcare setting*)

Dear [Name of facility owner/manager],

On [date], the [LHD] was notified that [#] [tenants/residents/guests] of your facility were diagnosed with Legionnaires' disease (LD) and reported spending time at your facility prior to becoming ill. When two or more individuals are diagnosed with LD and linked to the same facility within a 12-month period, it is considered an outbreak and raises concerns about potential ongoing *Legionella* transmission within your facility.

To prevent further risk, the [LHD], in collaboration with the New Jersey Department of Health, recommends a full outbreak investigation. We request your cooperation in working with your building management, maintenance, and/or risk management teams. A key part of this investigation will involve an environmental assessment and sampling of your building water system(s). Based on the findings, additional response actions may be warranted.

LD is a severe form of pneumonia caused by *Legionella* bacteria, which grows in building water systems and spreads through inhalation of water droplets (aerosolized water) containing the bacteria. While most healthy people don't develop LD from exposure, those who are 50 years or older, or who have certain risk factors—such as being a smoker, having chronic lung disease, a weakened immune system, or taking medications that suppress the immune system—are at higher risk. LD is treatable with antibiotics, but it can lead to serious complications, such as lung failure or death.

Please provide your availability for a one-hour conference call within the next five business days to discuss next steps. Additionally, complete the attached Facility Background Assessment Tool and return it at least 24 hours before the call. Kindly include your facility's Water Management Program and any environmental *Legionella* test results from the past 12 months (if available). Further recommendations will follow once we have received the completed assessment tool.

We appreciate your prompt cooperation and look forward to working with you to ensure the safety and well-being of your [tenants/residents/guests]. In the meantime, should you have any additional information, questions, or if you learn of new cases of LD among staff, guests, or visitors, please contact [LHD Name, Phone, Email].

Thank you for your time and attention to this important matter.

Sincerely,

[LHD POC name and contact details]

LHD Template: Notification Letter to a Travel Accommodation Regarding a Single Travel-Associated Legionnaires' Disease Case

[Insert date]

Dear Hotel Management:

On [date], [local health department] was notified that a recent guest of your hotel has been diagnosed with Legionnaires' disease. Legionnaires' disease is a very serious type of pneumonia (lung infection) caused by bacteria called *Legionella*. People can get Legionnaires' disease when they breathe in small droplets of water in the air that contain the bacteria. Hotel spas, whirlpools, showers, and cooling towers have previously been shown to be sources of Legionnaires' disease outbreaks. If a second guest of your hotel develops Legionnaires' disease within 12-months of the first guest, a full public health and environmental investigation will be warranted in your facility. We are providing this letter to you for your information only.

Legionella bacteria are common in the environment and can persist unless proper steps are taken to prevent the growth of bacteria. Please take this opportunity to review your water maintenance procedures to help minimize future risk. The following resources may be helpful:

- The Centers for Disease Control and Prevention Toolkit for "Controlling *Legionella* in Common Sources of Exposure." This toolkit is available at https://www.cdc.gov/legionella/downloads/Control-Toolkit-All-Modules.pdf.
- The Centers for Disease Control and Prevention Toolkit "Developing a Water Management Program to Reduce *Legionella* Growth and Spread in Buildings." This toolkit is available at https://www.cdc.gov/legionella/wmp/toolkit/index.html.
- The Centers for Disease Control and Prevention "Preventing Legionnaires' Disease: A Training on *Legionella* Water Management Programs (PreventLD Training)." This training is available at https://www.cdc.gov/nceh/ehs/elearn/prevent-LD-training.html.
- The American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Guideline-12 "Minimizing the Risk of Legionellosis Associated with Building Water Systems." This document is available at www.ashrae.org.
- ASHRAE Standard-188 "Legionellosis: Risk Management for Building Water Systems." This document is available at www.ashrae.org.

It is possible that other guests will contact you if they were diagnosed with Legionnaires' disease after a stay at your hotel. Please inform [LHD name] immediately if you learn of other potential Legionnaires' disease diagnoses among guests, staff, or visitors of your hotel.

If you have any questions regarding this notice, please do not hesitate to contact [name and contact details for LHD]. Thank you for your time and attention.

Sincerely,

[LHD POC name and contact details]

[Insert date]

Template Notification: Letter to Guests Who Recently Visited a Hotel Associated with a Legionnaires' Disease Outbreak (Post-Exposure)

[Date]

Dear Recent Hotel Guest,

[Hotel Management] is working with the [LHD] and the New Jersey Department of Health (NJDOH) to treat the water at [Hotel Name] after [insert number] guests have been reported sick with Legionnaires' disease, a serious type of pneumonia.

In response to the reports of these three guests who became ill, the [LHD] along with NJDOH and with the full cooperation of [Hotel Name Management], initiated an investigation to determine if the building is a source of *Legionella* exposure. Testing results found *Legionella* bacteria in samples taken from the hotel's water system. It is unknown whether the hotel is the source of bacteria that caused these people to become sick. Although the investigation is ongoing, we wanted to notify you about your potential exposure to the bacteria since you were a registered guest at the hotel.

People can get Legionnaires' disease by breathing in aerosolized water (small water droplets in the air) containing *Legionella* bacteria. Legionnaires' disease cannot be spread from person-to-person. **Symptoms of Legionnaires' disease can include fever, cough, shortness of breath, chest pain, muscle aches, and headaches.** Symptoms occur within 14 days after being exposed to *Legionella* bacteria.

The risk of developing Legionnaires' disease for healthy individuals is low, especially for healthy people. However, the risk is higher among people who **are 50 years or older, have chronic lung disease, have a weakened immune system, or take medicines that weaken the immune system.**

Past guests are encouraged to monitor their health for symptoms of Legionnaires' disease. If you or any person who visited the hotel with you begins to **develop symptoms of Legionnaire's disease within 14 days (two weeks) after your stay at the [Hotel Name], please seek medical attention right away.** Bring this letter with you to show to the doctor. Legionnaires' disease is treatable with an appropriate antibiotic.

If you have questions about this public health investigation, please contact the [LHD], Monday through Friday 8:30am-4:30pm at [phone number]. Be sure to include your name and contact information. Additional information about Legionnaires' disease can be found at the Centers for Disease Control and Prevention (CDC) website at: https://www.cdc.gov/legionella/index.html.

Sincerely,

[Hotel Management]

Template Notification: Letter to Incoming Hotel Guests during a Legionnaires' Disease Outbreak Investigation (Pre-Exposure)

Dear Hotel Guest,

[Hotel Management] is working with the [LHD] and the New Jersey Department of Health (NJDOH) to treat the water at [Hotel Name] after [insert number] guests have been reported sick with Legionnaires' disease, a serious type of pneumonia, after their stay. People can get Legionnaires' disease by breathing in aerosolized water (small water droplets in the air) containing *Legionella* bacteria. Legionnaires' disease cannot be spread from person-to-person. **Symptoms of Legionnaires' disease can include fever, cough, shortness of breath, muscle aches, and headaches.** Symptoms occur within 14 days after being exposed to *Legionella* bacteria.

In response to the reports of these three guests who became ill, [LHD] along with NJDOH and with the full cooperation of [Hotel Name Management], investigated to determine if the building is a source of *Legionella* exposure. Testing results found *Legionella* bacteria in samples taken from the hotel's water system. It is unknown whether the hotel is the source of bacteria that caused these people to become sick. Currently, we are working toward disinfecting the hotel's water system to kill any remaining *Legionella* and prevent more from growing.

The purpose of this notice is making you aware that *Legionella* bacteria has been detected in the hotel's water. The risk of getting sick from a building's water supply is low, especially for healthy people. Your individual risk for Legionnaires' disease may increase if you are 50 years or older (especially if you smoke), have chronic lung disease, have a weakened immune system, or take medicines that weaken your immune system. If you have one of these health issues, take these extra steps during your stay as precautions:

- Do not take a shower, even a cool shower – since it could create aerosolized water. Instead, take a bath, but fill the tub slowly. Try to minimize your time in the bathroom while the tub is filling.
- It is fine to brush your teeth, wash your hands or wash dishes, but fill the sink slowly to avoid creating mist.
- It is fine to drink cold water from the tap but start with cold water when heating water for tea, coffee, or cooking. Use cold water to fill the coffee pot.

If you or any person who visited the hotel with you begins to develop symptoms of Legionnaires' disease within 14 days (two weeks) after your stay at the [Hotel Name], please seek medical attention right away. Bring this letter with you to show to the doctor. Legionnaires' disease is treatable with an appropriate antibiotic.

If you have questions about your hotel reservation, please contact the [Hotel Name] at [Contact Information]. If you have questions about this public health investigation, please contact the [LHD], Monday through Friday 8:30am-4:30pm at [phone number]. Be sure to include your name and contact information. Additional information about Legionnaires' disease can be found at the Centers for Disease Control and Prevention (CDC) website at: https://www.cdc.gov/legionella/index.html.

Sincerely,

[Hotel Management]

LETTER TO RESIDENTIAL BUILDING OWNER/MANAGER RE: SINGLE LD CASE

[Insert date]

Dear Building Management:

On [date], [LHD] was notified that a tenant of [building name] has been diagnosed with Legionnaires' disease, a very serious type of pneumonia (lung infection) caused by breathing in aerosolized water (small droplets in the air) that contain the bacteria *Legionella*. If a second case of Legionnaires' disease is identified at [building name] within 12-months of the first tenant, [LHD] will investigate to determine whether your building is the source of infection by conducting a full environmental assessment.

Residential buildings, such as apartment complexes and hotels, have been associated with Legionnaires' outbreaks in the past. *Legionella* are commonly found in the natural environment (e.g., lakes, streams) but can become a health concern when they enter a building's water system (plumbing). People can breathe in water containing *Legionella* by using a shower, hot tub, or sink. Other sources of aerosolized water include decorative fountains and cooling towers. *Legionella* can continue to persist in the water system unless proper steps are taken to prevent the growth of bacteria. Please take this opportunity to review your water maintenance procedures and develop a water management program to help minimize future risk. The following resources may be helpful:

- The Centers for Disease Control and Prevention Toolkit for "Controlling *Legionella* in Common Sources of Exposure." This toolkit is available at https://www.cdc.gov/legionella/downloads/Control-Toolkit-All-Modules.pdf.
- The Centers for Disease Control and Prevention Toolkit "Developing a Water Management Program to Reduce *Legionella* Growth and Spread in Buildings."

  This toolkit is available at https://www.cdc.gov/legionella/wmp/toolkit/index.html.
- The Centers for Disease Control and Prevention "Preventing Legionnaires' Disease: A Training on *Legionella* Water Management Programs (PreventLD Training)." This training is available at https://www.cdc.gov/nceh/ehs/elearn/prevent-LD-training.html.
- The American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Guideline 12-2020 "Minimizing the Risk of Legionellosis Associated with Building Water Systems." This document is available at www.ashrae.org.
- The American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Standard 188-2021 "Legionellosis: Risk Management for Building Water Systems." This document is available at www.ashrae.org.

It is possible that other tenants of your building will contact you if they were diagnosed with Legionnaires' disease. Please inform [LHD name] immediately if you learn of other potential Legionnaires' disease diagnoses among tenants, staff, or visitors of your building. If you have any questions regarding this notice, please do not hesitate to contact [name and contact details for LHD]. Thank you for your time and attention.

Sincerely,

[LHD POC name and contact details]

LETTER FOR TENANTS – ENVIRONMENTAL TESTING RESULTS PENDING

[Insert date]

Dear Neighbor,

[Building Name] has been notified that [#] tenants of the building became sick with Legionnaires' disease, a type of pneumonia. In response, [Building Name] is working with the [Local Health Department] and New Jersey Department of Health (NJDOH) to test the water in your building for the bacteria (*Legionella*) that causes Legionnaires' disease. We wanted to notify you right away about this testing and we will keep you informed once we have the results.

Legionnaires' disease is a type of pneumonia caused by bacteria called *Legionella*. People can get Legionnaires' disease by breathing in aerosolized (small droplets) of water containing *Legionella* bacteria. Aerosolized water can come from showers, faucets, hot tubs, humidifiers, and decorative fountains. **Legionnaires' disease is not spread from person-to-person**.

The risk of getting sick from a building's water system is very low, especially for healthy people. The most important thing you can do is to get medical attention right away if you start having symptoms such as fever, cough, shortness of breath, chills, and muscle aches. This is even more important if you are aged 50 or older (especially if you smoke cigarettes), have chronic lung disease, have a weakened immune system, or take medicines that weaken your immune system. While Legionnaires' disease is serious, it can be treated with antibiotics.

If you have one of the health issues above, take these extra steps as a precaution:

- Consider taking a bath instead of a shower, since a shower could create a water mist. Try to minimize your time in the bathroom while the tub is filling.
- Avoid use of tap water in respiratory equipment and devices, such as CPAP/BiPAP machines and humidifiers.
- It is fine to brush your teeth, wash your hands, or wash dishes, but fill the sink slowly to avoid creating mist.
- It is fine to drink cold water from the tap but start with cold water when heating water for tea, coffee, or cooking. You cannot get Legionnaires' disease by drinking water. However, if you have swallowing issues, drink bottled water.

We will continue to update you on important information about your building. If you have questions about Legionnaires' disease, please contact the [Local Health Department] at (999)-999-9999. Be sure to include your name and contact information. Additional information about Legionnaires' disease can be found at the NJDOH website at: https://www.nj.gov/health/cd/topics/legion.shtml.

Sincerely,

[Building point of contact]

LETTER FOR TENANTS – ENVIRONMENTAL TESTING RESULTS POSITIVE

[insert date]

Dear Neighbor,

Between [month/year of first case] and [month/year of last case], [insert number] tenants of the building became ill with Legionnaires' disease, a type of pneumonia. In cooperating with [LHD] and the New Jersey Department of Health, [building management] promptly tested your building's water for the bacteria (*Legionella*) that causes Legionnaires' disease. The test results show *Legionella* bacteria in the building's water system, which can make people sick. Management has hired a third-party contractor to disinfect (clean) the water system to kill the *Legionella* bacteria. Water testing will be ongoing to ensure the disinfection process was successful. You will be notified if any additional work is being performed.

Legionnaires' disease is a type of pneumonia caused by bacteria called *Legionella*. People can get Legionnaires' disease by breathing in aerosolized (small droplets) of water containing *Legionella* bacteria. Aerosolized water can come from showers, faucets, hot tubs, humidifiers, and decorative fountains. **Legionnaires' disease is not spread from person-to-person**.

The risk of getting sick from a building's water system is very low, especially for healthy people. The most important thing you can do is to get medical attention right away if you start having symptoms such as fever, cough, shortness of breath, chills, and muscle aches. This is even more important if you are aged 50 or older (especially if you smoke cigarettes), have chronic lung disease, have a weakened immune system, or take medicines that weaken your immune system. While Legionnaires' disease is serious, it can be treated with antibiotics.

Tenants are currently being advised to these extra steps as a precaution to limit your exposure to the bacteria:

- Take a bath instead of a shower, since a shower could create a water mist. Minimize your time in the bathroom while the tub is filling. If you cannot take a bath, take a sponge bath.
- It is fine to wash dishes but fill the sink slowly to avoid creating mist.
- It is fine to drink cold water from the tap but start with cold when heating/boiling water for tea, coffee, or cooking.
- If you have swallowing issues, drink bottled water.
- Never use tap water in respiratory equipment such as a CPAP machine or humidifier.

We will continue to update you on important information about your building. If you have questions about Legionnaires' disease, please contact the [LHD at phone number]. Be sure to include your name and contact information. Additional information about Legionnaires' disease can be found at the Centers for Disease Control and Prevention (CDC) website at: https://www.cdc.gov/legionella/index.html.

Sincerely,

[Building point of contact]

VI. APPENDIX

PATIENT INTERVIEW TOOLS

NJDOH's Legionnaires' Disease Cluster Hypothesis Generating Questionnaire

- This form collects information about possible exposures to *Legionella*. These data may be useful in detecting or investigating community-associated outbreaks.

Legionnaires' Disease Cruise Ship Questionnaire Template

- This form collects exposure data for cases that may be associated with a cruise ship.

Legionnaires' Disease Medical Record Abstraction Form Template

- This form collects clinical and epidemiologic data, and it can help confirm and classify a case of Legionnaires' disease in a patient with a complicated clinical history.
- For outbreaks in healthcare settings, you may customize this form to the outbreak location and complete it for confirmed or suspect cases associated with the outbreak.

Legionnaires' Disease Cluster Hypothesis Generating Questionnaire

<Instructions to the interviewer appear in italics. Please read the entire questionnaire before beginning the interview.>

Interviewer: _____

Date: _____

Initials of Case-Patient: _____ DOB: _____ NJ Case ID (pre-fill): _____

What was the patient's outcome? ☐ Recovered ☐ Still Ill ☐ Died ☐ Unknown

Patient contact information

Name: _____ Age: _____ Sex: ☐ M ☐ F

Address: _____

City: _____ State: _____ Zip: _____ County: _____

Phone: _____ Alt. phone: _____

Proxy contact information *<List proxy contact information if patient is unable to be interviewed or has died.>*

Name: _____ Relationship to patient: _____

Phone: _____ Alt. phone: _____

Please fax the completed questionnaire to 609-292-5811 or send attached to an encrypted email to PreventLD@doh.nj.gov

Template Call Script (ONLY READ IF INITIAL CALL AND NOT PREVIOUSLY SCHEDULED)

Hello, my name is [Interviewer] and I'm calling from the [LHD]. May I speak with [patient]?

I would like to follow up with a few questions regarding your recent hospitalization at [hospital name]. While you were at the hospital, were you told if you had a lung infection, or a type of pneumonia called Legionnaires' disease?

<If they are unaware of their diagnosis, ask them why they went to the hospital and ask about what signs/symptoms they had. Explain that the hospital performed a lab test that detected Legionella bacteria.>

Legionnaires' disease is caused by breathing in water droplets that have *Legionella* bacteria in them. The bacteria enter your lungs and can make you sick. We are seeing an increase in people with Legionnaires' disease in the area and we are concerned there is an ongoing risk to the public. I would like to ask you about what you did in the 14 days before you got sick. This can help us possibly figure out where you may have been exposed to Legionella bacteria and can help us prevent others from getting sick. The interview typically takes 20 minutes to complete. Do you have a few minutes to talk?

<Additionally, it may be helpful for the patient to review bank statements, receipts, recent transactions (e.g., credit cards, gift cards), and/or text messages to help aid in recalling this information>

<If not, schedule a day/time that is more convenient for them. Explain the importance of the interview and that it should not be delayed for too long>

Communication Log			
Date and Time	**Contact Outcome**	**Scheduled Call Back Date and Time**	**Communication Note**

1. Illness Onset

<First you want to establish the illness onset date. Ask about the patient's symptoms>

The symptoms of Legionnaires' disease may include fever, cough, shortness of breath, chest pain, abdominal pain, diarrhea, nausea, confusion, body aches, and headache. Did you have any of these symptoms? What day did they begin?

<Check all that apply and document onset date>

Onset date	**Symptom**	**Onset date**	**Symptom**
	Fever		Diarrhea
	Cough		Nausea
	Shortness of breath		Confusion
	Chest pain		Body aches
	Abdominal pain (stomach aches)		Headache

Were you hospitalized for your illness? ☐ Yes ☐ No ☐ Do Not Know

If yes, what date did you go to the hospital? __/__/____

Were you diagnosed with pneumonia by a healthcare provider? ☐ Yes ☐ No ☐ Do Not Know

<*Important: Use a calendar to calculate the exposure period. Start at the date of earliest symptom onset documented above and count backwards 14 days.>*

<*Document exposure period here: _____ to _____>*

For the remainder of the interview, I am going to ask you about the 14 days before you became ill. The 14 days prior to your illness would be from [*day of the week*] __/__/____ to [*day of the week*] __/__/____. The rest of the questions will ask about the places you visited during this time. If you don't remember exactly where you visited during this time, just say you don't know. If you cannot remember exactly but I mention a place you generally go, please let me know.

2. Medical Device Use

In the 14 days prior to illness onset did you use a humidifier, nebulizer, CPAP, BiPAP, or any respiratory therapy equipment for the treatment of sleep apnea, COPD, asthma, or for any other reason?

☐ Yes ☐ No ☐ Not sure

<If yes, complete the following table:>

Type of device	Location used	Date(s)

If yes, does this device use a humidifier? ☐ Yes ☐ No ☐ Do Not Know

If yes, describe what type of water you use in this device (e.g., sterile, tap, distilled).

3. Occupation

In the 14 days prior to becoming ill, did you work or volunteer either part-time or full-time?

☐ Yes ☐ No ☐ Not sure

<If yes, complete the following table:>

Name of facility and location	Dates	Describe type of work and any possible exposures to water at work

4. Construction Exposures

In the 14 days prior to becoming ill, did you have any exposure to general construction, plumbing projects, or water main breaks (e.g., any water disruptions such as brown water/low water flow)?

☐ Yes ☐ No ☐ Not sure

<If yes, complete the following table:>

Describe exposure	Address of exposure	Dates of exposure

5. Water Usage

In the 14 days prior to becoming ill, did you have any exposure to aerosolized water at home (or at work) such as washing the car, water the garden, using the hose, or using a power washer?

☐ Yes ☐ No ☐ Not sure

<If yes, complete the following table:>

Describe exposure	Address of exposure	Dates of exposure

6. Other Exposures *<ensure you specifically state that you are asking about exposures in the 14 days prior to becoming ill>*

Exposures	*<Check one:>*			Name and Address	Date(s)
	Yes	No	Not sure		
A. Did you shop for groceries at a grocery store, farmers market, food co-op? *(If they say no, ask them where they typically grocery shop)*					
B. Did you go shopping or run any errands (e.g., malls, outdoor shopping centers, hardware stores, nurseries, etc.) *(If they say no, ask them what routine errands they may typically do)*					
C. Did you visit any convenience stores such as … [*name several convenience stores in their community*]?					
D. Did you visit any fast-food establishments such as … [*name several fast-food establishments in their community*]?					

6. Other Exposures *<ensure you specifically state that you are asking about exposures in the 14 days prior to becoming ill>*					
Exposures	***<Check one:>***			**Name and Address**	**Date(s)**
	Yes	**No**	**Not sure**		
E. Did you go to any restaurants, bars, or casinos?					
F. Did you attend any religious services or visit a church, synagogue, mosque, or temple?					
G. Did you visit any recreational centers, community centers, sports clubs, or gyms?					
H. Did you attend any gatherings such as wedding, potluck, BBQ, convention, charity event, street fair, or party?					
I. Did you work at, get treatment in, or visit a healthcare setting (e.g., hospitals, nursing homes, outpatient clinic, dental office)?					
J. Did you work at or visit an assisted living facility or senior living facility?					

6. Other Exposures *<ensure you specifically state that you are asking about exposures in the 14 days prior to becoming ill>*					
Exposures	***<Check one:>***			**Name and Address**	**Date(s)**
	Yes	**No**	**Not sure**		
K. Did you work/volunteer at, reside in, or visit a congregate living facility (e.g., correctional facility, shelter, dormitory)?					
L. Did you visit any travel accommodations such as a hotel, motel, resort, or air bnb?					
M. Did you spend any nights away from home?					
N. Did you use or go near a whirlpool or hot tub?					
O. Did you walk through or visit any playgrounds or parks?					
P. Did you visit or walk by any decorative fountains, such as a fountain in a mall?					
Q. Did you visit any transportation hubs such as a train station, bus terminal, or airport?					
Add additional questions as needed. Consider including locations other case-patients visited or businesses nearby.					

7. Open Ended Questions

A. When leaving your home, do you normally walk, drive, or take public transportation such as a bus?

If they drive, ask them which gas station(s) they went to, or typically go to.

☐ Walk ☐ Drive ☐ Public Transportation

B. Please tell me about other places you may have visited during the 2 weeks prior to becoming ill.

☐ Yes ☐ No ☐ Not sure

<If yes, describe the activities:>

D. Did you go anywhere else during the 14 days prior to becoming ill, that I have not asked about (e.g., hair salon, friend's house, post office):

☐ Yes ☐ No ☐ Not sure

<If yes, describe the location names, addresses, and dates:>

E. Are there any other locations that you visit regularly?

☐ Yes ☐ No ☐ Not sure

<If yes, describe the location names, addresses, and dates:>

<Thank the interviewee for their time>

GUIDELINES, STANDARDS, AND LAWS

ASHRAE 188-2021, Legionellosis: Risk Management for Building Water Systems

Summary: Establishes minimum legionellosis risk management requirements for building water systems.

Link: https://www.ashrae.org/technical-resources/standards-and-guidelines/guidance-on-reducing-the- risk-of-*Legionella*

ASHRAE 12-2020, Minimizing the Risk of Legionellosis Associated with Building Water Systems

Summary: Provides information and guidance in order to minimize *Legionella* contamination in building water systems.

Link: https://www.ashrae.org/technical-resources/standards-and-guidelines/guidance-on-reducing-the- risk-of-*Legionella*

VA DIR 1061, Prevention of Healthcare-Associated *Legionella* Disease and Scald Injury from Potable Water Distribution Systems

Summary: Establishes policy for the prevention and control of healthcare-associated *Legionella* disease in VHA-owned buildings in which patients, residents, or visitors stay overnight.

Link: https://www.va.gov/VHApublications/ViewPublication.asp?pub_ID=3033

WRF Project No. 4664, Customer Messaging on Opportunistic Pathogens in Plumbing Systems

Summary: A series of messages for the water community to use when communicating with different audiences about *Legionella* in building water systems. Also includes recommendations for the best practices of reaching various audience segments, along with samples of each tactic.

Link: http://www.waterrf.org/PublicReportLibrary/4664.pdf

CDC PreventLD Training, Preventing Legionnaires' Disease: A Training on *Legionella* Water Management Programs

Summary: Online training aiming to outline how to reduce risk for *Legionella* in facilities through water management programs that align with industry standards such as ASHRAE 188-2021.

Link: https://www.cdc.gov/nceh/ehs/elearn/prevent-LD-training.html

CDC Developing a Water Management Program to Reduce *Legionella* Growth and Spread in Buildings: A Practical Guide to Implementing Industry Standards

Summary: Toolkit designed to help develop and implement a water management program to reduce risk for growing and spreading *Legionella* in building water systems.

Link: https://www.cdc.gov/*Legionella*/downloads/toolkit.pdf