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.
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 June 2023. 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](mailto: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.

<table>
<thead>
<tr>
<th></th>
<th>Legionnaires’ disease</th>
<th>Pontiac fever</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clinical features</strong></td>
<td>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</td>
<td>A milder illness, self-limited, without pneumonia, often a flu-like illness (fever, chills, myalgia, malaise).</td>
</tr>
<tr>
<td><strong>Pneumonia (clinical or radiographic)</strong></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Pathogenesis</strong></td>
<td>Replication of organism</td>
<td>Possibly an inflammatory response to endotoxin</td>
</tr>
<tr>
<td><strong>Incubation period</strong></td>
<td>2 to 14 days after exposure</td>
<td>24 to 72 hours after exposure</td>
</tr>
<tr>
<td><strong>Treatment</strong></td>
<td>Antibiotics</td>
<td>Supportive care (self-resolving)</td>
</tr>
<tr>
<td><strong>Isolation of organism</strong></td>
<td>Possible</td>
<td>Never possible</td>
</tr>
<tr>
<td><strong>Case-fatality rate</strong></td>
<td>10% (25% for healthcare-associated)</td>
<td>0%</td>
</tr>
</tbody>
</table>
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/clinicians.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**: 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**: A case with ≥10 days of continuous stay at a healthcare facility during the 14 days before onset of symptoms.

- **Possible healthcare**: 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.

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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 INVESTIGATION

Local health departments are responsible for investigating all reports of legionellosis in their jurisdiction. Ensure timely investigation of each case; if initially the patient is unable to communicate for interview due to severity of illness, conduct the initial interview with the patient’s surrogate and interview the patient when the patient can communicate. After verifying the patient’s illness onset date, the patient should be interviewed about the 14 days prior to onset of symptoms. Most reports of legionellosis are among people who are hospitalized; hospital records are helpful in reviewing to obtain case information including illness onset.

At minimum, collect key demographic, clinical, exposure, and reporting details for surveillance purposes. Clinical details such as signs, symptoms, pneumonia based on clinical or radiologic examination, and onset dates are important for case classification purposes. Symptoms may include fever, cough, shortness of breath, chest pain, myalgia, headache, confusion, nausea, and diarrhea.

Exposure details include risk factors, travel history, exposure to respiratory equipment (e.g., CPAP or nebulizer) and hot tubs, and other potential exposures such as hospital, dental, and long-term care facility visits/stays or visits to any other location where aerosolization of water may have occurred (e.g., gyms, saunas, casinos/restaurants with outdoor misters or fountains, truck stops with showers, assisted or senior living facility, etc.).

Public health officials may wish to gather additional information about possible exposures. This information helps detect both locally acquired and travel-related outbreaks. Local health departments are encouraged to use or adapt the Legionnaires’ Disease Cluster Hypothesis-generating Questionnaire to collect additional information about possible exposures to Legionella.

Ensure all information gathered during the public health investigation is entered into the Communicable Disease Reporting and Surveillance System (CDRSS). Please note that the NJDOH no longer requests that Local Health Departments complete the CDC Legionellosis Case Report Form.
Case Investigation Steps

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

- 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.

- Verify clinical information with infection preventionist (IP).
  - Determine if the patient was treated in emergency department or admitted, including date of ED visit or admission.
  - Determine what signs and symptoms the patient presented with (e.g., cough, chest pain, shortness of breath, fever, headache, muscle aches, etc.), and if possible, illness onset date of each.
  - Determine if the patient was diagnosed with pneumonia by a chest x-ray or CT scan (request that the IP enter radiographic results in CDRSS).
  - Determine discharge date and clinical outcome (survived, recovering, deceased); if the patient is still hospitalized, check back with hospital until discharge.
  - Determine the patient’s underlying health conditions (e.g., current or former smoker, immunocompromised, renal or liver disease, respiratory conditions such as COPD, etc.).

- Verify that the case meets the confirmed or suspected clinical AND laboratory criteria. Reports that do not meet these criteria can be closed as “not a case”. Please document the reasoning within CDRSS.

- Contact the case-patient (or surrogate) to complete the interview process.
  - Verify the patient’s demographics (e.g., DOB, address, sex, ethnicity, race).
  - Determine the patient’s occupation and workplace address. Document this information under the Industry and Occupation Information section within CDRSS.
    - Note 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).
  - 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:
    - Diagnosing healthcare provider or hospital infection preventionist
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.

- 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.).

- 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).

- Classify the case as “LHD closed” once the investigation is complete.

- 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.

- Jurisdictions that are experiencing a significant increase in legionellosis cases should interview the cases with NJDOH’s Legionellosis Cluster Hypothesis-Generating Questionnaire to gather detailed information that may link exposures to additional cases.
MANAGING SPECIAL SITUATIONS OF SINGLE CASES

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 of legionellosis that 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 HIPAA or patient confidentiality rules). Below are examples which would warrant notification or additional follow up. LHDs may use and adapt these notification letter templates.

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 the 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 the 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 the case. The LHD may need to check with NJDOH to ensure there are no other reported cases are associated with the facility.

**Cruise Ship-Associated Legionellosis Case**

The LHD should complete the [CDC Legionnaires’ Disease Cruise Ship Questionnaire](https://www.cdc.gov/legionnaires/disease/cruise-ship/questionnaire.html) 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 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 CHECKLIST

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**

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<thead>
<tr>
<th>Disease:</th>
<th>LEGIONELLOSIS</th>
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<tbody>
<tr>
<td>Illness Onset Date:</td>
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<tr>
<td>Case Status:</td>
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<td>Age at onset:</td>
<td>51 yrs 6 mos</td>
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<tr>
<td>Date Reported to State or Local Health Department:</td>
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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**

<table>
<thead>
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<th>DOE</th>
</tr>
</thead>
<tbody>
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<td>M.</td>
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### Addresses

**Primary Address**

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<tr>
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<td>(655) 555-5555</td>
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<td>Fax</td>
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<tr>
<td>Added By</td>
<td>ROSS KATHLEEN</td>
</tr>
<tr>
<td>Added Date</td>
<td>07/19/2021</td>
</tr>
</tbody>
</table>

**Additional Address Information**

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address Type</td>
<td>WORK PLACE</td>
</tr>
<tr>
<td>Location Name</td>
<td>NEW JERSEY DEPARTMENT OF HEALTH</td>
</tr>
<tr>
<td>Street</td>
<td>369 S WARREN ST</td>
</tr>
<tr>
<td>State</td>
<td>NJ</td>
</tr>
<tr>
<td>Zip</td>
<td>08608</td>
</tr>
<tr>
<td>Primary Phone</td>
<td></td>
</tr>
<tr>
<td>Fax</td>
<td></td>
</tr>
<tr>
<td>Date range</td>
<td>01/01/2021 - 07/15/2021</td>
</tr>
</tbody>
</table>

**Comments**

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

*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.

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”.

---

**Laboratory Information**

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

**Diagnostic Information**

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Findings</th>
<th>Test Result Data</th>
<th>Test Date</th>
<th>Medical Facility</th>
<th>Delete</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-SCAN</td>
<td>ABNORMAL</td>
<td>RLL pneumonia</td>
<td>07/17/2021</td>
<td>NJPHEL</td>
<td></td>
</tr>
<tr>
<td>X-RAY</td>
<td>ABNORMAL</td>
<td>Infiltrates</td>
<td>07/16/2021</td>
<td>NJPHEL</td>
<td></td>
</tr>
</tbody>
</table>
### Clinical Status

<table>
<thead>
<tr>
<th>Clinical Status Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Illness Onset Date:</strong></td>
</tr>
<tr>
<td><strong>Date of Initial Health Care Evaluation:</strong></td>
</tr>
<tr>
<td><strong>Reason for Testing:</strong></td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Sign/Symptom</th>
<th>Response</th>
<th>Attribute</th>
<th>Onset Date</th>
<th>Resolution Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>PNEUMONIA</td>
<td>YES</td>
<td>RLL pneumonia</td>
<td>07/16/2021</td>
<td></td>
</tr>
<tr>
<td>CHEST PAIN</td>
<td>YES</td>
<td></td>
<td>07/15/2021</td>
<td></td>
</tr>
<tr>
<td>COUGH</td>
<td>YES</td>
<td>PRODUCTIVE</td>
<td>07/15/2021</td>
<td></td>
</tr>
<tr>
<td>FEVER</td>
<td>YES</td>
<td>HIGH</td>
<td>07/15/2021</td>
<td></td>
</tr>
<tr>
<td>HEADACHE</td>
<td>YES</td>
<td></td>
<td>07/15/2021</td>
<td></td>
</tr>
<tr>
<td>MALAISE (DISCOMFORT)</td>
<td>YES</td>
<td></td>
<td>07/15/2021</td>
<td></td>
</tr>
<tr>
<td>SHORTNESS OF BREATH</td>
<td>YES</td>
<td></td>
<td>07/15/2021</td>
<td></td>
</tr>
</tbody>
</table>

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

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

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

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.
<table>
<thead>
<tr>
<th>Question</th>
<th>Yes/No</th>
<th>Location/Date</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public Gathering?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location of Exposure (Facility Name, Address, City, State)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date(s) of Exposure</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>14 Days Before Onset, was the patient near a decorative fountain or water feature?</strong></td>
<td>Yes</td>
<td>Garden Show at NJ Conference Center located at 135 E. State Street, Trenton, NJ 07/12/2021</td>
</tr>
<tr>
<td>Location of Exposure (Facility Name, Address, City, State)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date(s) of Exposure</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>14 Days Before Onset, was the patient near a water mister?</strong></td>
<td>Yes</td>
<td>Decorative fountain at the mall of NJ located at 135 E. State Street, Trenton, NJ 07/12/2021</td>
</tr>
<tr>
<td>Describe Type of Mister</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location of Exposure (Facility Name, Address, City, State)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date(s) of Exposure</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>14 Days Before Onset, was the patient near an operating water sprinkler system?</strong></td>
<td>Yes</td>
<td>Cooling mister at restaurant</td>
</tr>
<tr>
<td>Describe Type of Sprinkler</td>
<td></td>
<td>Restaurant of NJ located at 135 E. State Street, Trenton, NJ 07/12/2021</td>
</tr>
<tr>
<td>Location of Exposure (Facility Name, Address, City, State)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date(s) of Exposure</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>14 Days Before Onset, did the patient visit a water park?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>14 Days Before Onset, did the patient shower away from home?</strong></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Location of Exposure (Facility Name, Address, City, State)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date(s) of Exposure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has there been any recent (last 6-12 months) or ongoing major construction at or around the patient's residence?</td>
<td></td>
<td>Water main break</td>
</tr>
<tr>
<td>Describe Type of Work</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did the construction result in disruptions or changes to the water (e.g., loss of water, changes in water pressure)?</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Did the construction result in disruptions or changes to the water (e.g., loss of water, changes in water pressure)?</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td><strong>14 Days Before Onset, did the patient have any exposure to aerosolized water at home?</strong></td>
<td>Yes</td>
<td>Hot tub use and washing the car</td>
</tr>
<tr>
<td>Describe Type of Exposure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date(s) of Exposure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the patient work or volunteer in construction or other occupations involving water exposures?</td>
<td>Yes</td>
<td>Volunteers as a lifeguard at NJ youth camp located at 135 E. State Street, Trenton, NJ 07/02/2021</td>
</tr>
<tr>
<td>Describe Type of Work and exposures to water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date(s) of Exposure</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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: PreventLD@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: PreventLD@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 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
  o 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 cases associated with the same possible source within a 12-month period
• ≥ 3 cases associated with the same possible source regardless of time frame
  o ≥ 3 cases associated with a facility, with more than 12 months between each case
  o ≥ 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. |

**FULL OUTBREAK INVESTIGATION PROTOCOL FOR A SINGLE FACILITY**

Once public health officials have determined that they need to conduct a full investigation, there is a series of steps that should take place. The following outbreak investigation steps are not exhaustive but are intended to help guide Local Health Departments during an outbreak investigation.

1. **Initial Activities**
   a. NJDOH will create an outbreak identification number (e-number or i-number) within CDRSS’s Outbreak Module and will provide to the LHD for tracking of the investigation.
   b. The LHD with jurisdiction of the facility under investigation will notify the facility manager or owner once a report of legionellosis is confirmed and meets the one of the criteria to prompt an outbreak investigation. After notification, the LHD will schedule a conference call with the affected facility and NJDOH’s *Legionella* Team. It is important that representatives from the facility includes the building owner/manager and someone who is knowledgeable of the building water system(s). Healthcare facilities should include the administrator and director of nursing and/or infection preventionist.
c. The LHD will provide Facility Background Information Request Form that facility must provide prior to the scheduled conference call. LHD will establish the required timeframe for submission of the completed form. In addition, the LHD will request the following records as applicable to be submitted prior to the conference call:
   i. Water Management Program, recent water testing results (e.g., temperature, disinfectant residual, *Legionella*).
   ii. Building premises/plumbing system(s) engineering/mechanical/architectural plans including water riser(s) identification and floor plan layouts, and/or as-built drawings, and/or building water system(s) schematics.
   iii. Maintenance and operational logs of cooling towers, hot tubs, and decorative fountains.
   iv. Details of any recent operational changes to the management and/or operation of the building’s potable water distribution system(s.)

d. After the conference call, LHD will provide the facility with the *Legionella* Environmental Assessment Form (LEAF) that shall be completed by building owner/owner agent, facility operational staff or environmental consultant with a thorough understanding of the building operations and controls. The completed LEAF shall be returned to the LHD.

2. Conference Call and Interim Recommendations
   a. The LHD will conduct roll call during the conference call. The LHD may consider including the Health Officer, Disease Investigator, Public Health Nurse, and/or Registered Environmental Health Specialist.
   b. The LHD, or NJDOH upon request, will provide a background on Legionnaires’ disease and *Legionella* (ecology, environmental conditions, transmission, pathogenicity, diagnosing infections, reporting, case investigations, etc.).
   c. For healthcare facilities, the LHD will provide an overview of the case investigation including the patient’s underlying health conditions, risk factors, onset of signs and symptoms, diagnosis, and clinical outcome. Please note that this level of detail is not shared with non-healthcare facilities due to patient privacy concerns.
   d. The LHD, or NJDOH upon request, will review the facility’s responses on the Facility Background Information Request Form.
   e. NJDOH will provide verbal interim recommendations to the LHD and facility. Upon conclusion of the call, NJDOH will provide the recommendations in writing to the LHD to forward to the facility. This typically includes implementation of immediate control measures to minimize the risk of *Legionella* transmission in the facility, hiring of a *Legionella* consultant, scheduling an onsite building water system inspection, and developing an environmental sampling plan for *Legionella* testing as soon as practical (based on availability of the LHD, NJDOH, and the consultant).
3. Environmental Assessment of Building Water System
   a. The Legionella Investigation Team (representatives from LHD, NJDOH, and consultant) will conduct a visual inspection of the primary components of the building water system(s). This will include how the water in the building received, conditioned, treated, heated, and distributed throughout the building. Each facility’s building water system has a unique configuration; therefore, staff must partner with the engineering personnel at each facility who are knowledgeable about the premise plumbing system. This process often includes the review of construction/mechanical/plumbing drawings.
   b. The Legionella Investigation Team will use standardized tools to ascertain all relevant information. Any information not readily available during the site visit may be subsequently obtained by facility staff and submitted within a specified timeframe to the LHD.
   c. The Legionella Investigation Team will develop an environmental sampling plan for the facility to follow. This will include number of samples and sampling locations. NJDOH will provide the written sampling plan and any additional recommendations based on the findings of the environmental assessment to the LHD.

4. Environmental Sampling
   a. Environmental sampling is typically conducted by third party consultant and the facility is responsible for all costs associated with environmental sampling and testing.
   b. The sampling plan development entails selection of locations that represent a comprehensive cross-section analysis of the building water system(s) and inclusion of representative independent riser lines where water quality may vary. The sampling plan at minimum shall consist of the following site-specific applicable locations:
      i. Main cold water entry to the building
      ii. Well(s)
      iii. Cold water storage tank(s)
      iv. Centralized hot water heater(s)
      v. Hot water storage tank(s)
      vi. Expansion tank(s)
      vii. Hot water recirculation lines, if applicable
      viii. Every outlet from the case-patient’s rooms
      ix. Proximal point(s) in the distribution from hot water heater(s) and/or storage tank(s)
      x. Mid to distal point(s) in the distribution from hot water heater(s) and/or storage tank(s)
      xi. Distal point(s) in the distribution from hot water heater(s) and/or storage tank(s)
      xii. Non-potable water fixtures and devices such as cooling tower system(s), hot tub(s), decorative fountain(s), etc.
xiii. Any addition point(s) in the distribution determined to be representative of the building water system(s)
c. The consultant shall collect first-draw, 1000 mL bulk water samples at all locations identified on the environmental sampling plan.
d. In the event where original sampling plan location is not accessible, consultant shall diligently select an alternative sample immediately upstream or downstream from the original location on the same water servicing line (riser or lateral pipe).
e. Biofilm swab collection is recommended for outlets and fixtures in visibly poor condition.
f. In addition, the consultant shall measure and record pre-flush and post-flush water quality parameters at each sampling location. Note, post-flush water quality parameters must be measured after flushed water temperature has been stabilized and record the time it takes for temperature stabilization (time to temperature stabilization). At minimum following water quality parameters must be measured for pre-flush and post-flush sample:
   i. Temperature
   ii. Disinfectant residual
   iii. pH
   iv. Time to temperature stabilization for conducting post-flush water quality measurements
g. The measured water quality parameters shall be recorded on the Environmental Sample Data Sheet (ESDS) template, alternate locations and other onsite anomalous observations shall be documented in the “Note” column of ESDS template. Note, ESDS template can be tailored based on building specific requirements but must include all defined water quality parameters.
h. Samples must be sent to a CDC ELITE member laboratory for Legionella culture analysis, at minimum official laboratory report shall include the following:
   i. Legionella Species identification
   ii. Legionella Serogroup identification
   iii. Enumeration of the results (CFU/mL)
   iv. Minimum detection limits (MDL) / limit of detection (LOD)
i. A completed and signed relinquished chain of custody must be shared with LHD within 24 hours of the sample collection.
j. Results are typically available within 7-14 days. The facility must share Legionella testing laboratory analysis report and completed water quality parameters measurements (ESDS) that shall include list of any deviations from the sampling plan including alternate sample location(s). Laboratory analysis report(s) along with ESDS must be submitted to LHD within 24 hours of receipt from the laboratory.

5. Emergency Remediation (Chemical Shock)
a. The *Legionella* Investigation Team may recommend that a facility conduct an emergency remediation of the building water system (potable and/or non-potable) based on the findings of the epidemiologic and/or environmental investigations. ASHRAE Guideline 12-2020 defines a chemical shock as a remedial treatment to kill *Legionella* in potable water systems, using chemical disinfectants for a relatively short period frequently at concentrations well above maximum levels permitted for potable water.

b. If the *Legionella* Investigation Team recommends an emergency remediation, the facility must submit a remediation plan to the LHD. The remediation plan must at minimum include the following:

i. **Building Water System Inventory and Description**: A thorough inventory and description of the building water system(s) including detailed schematic that depicts the process flow and identify key components and devices such as hot water heaters, storage tanks, heat exchangers, pumps, centralized thermostatic mixing valves, piping, valves, cooling tower systems, hot tubs, decorative fountains, and other fixtures susceptible of *Legionella* contamination.

ii. **Hazard Analysis and Control Measures**: Systemic survey of building water system(s) based on hazard analysis of critical control points principles (HACCP) methodology in identification of potentially hazardous conditions that may contribute to *Legionella* growth. Determine the procedures for implementation of operational and maintenance procedures as controls measures that shall be applied to control the risk associated with the identified hazardous conditions. Identification of building-specific factors for implementation of effective control measures includes premise cold and hot water system design/layout, plumbing configurations, temperature controls, operational setting and sequencing, fluctuation in occupancy and water usage pattern.

iii. **Pre-Remediation Activities**: Establishment of procedures for cleaning/disinfection of building water system key components identified above (Section 5, Paragraph b, Item i) with clear written description of preventative maintenance protocols and procedures including original manufacturer recommendations/instructions, replacement of parts or equipment, removal or management of controls in place to mitigate dead legs, dead end pipe runs, low flow or stagnant conditions, and conformance of proper water pressure balancing of the building water system(s).

iv. **Remedial Treatment**: Selection of Disinfection type, treatment method, disinfectant concentration (C), and contact time (T), commonly expressed as C (mg/L) x T (min) or CT value for chemical shock remediation.

v. **Remedial Treatments Procedures**: Comprehensive chemical shock remediation implantation procedures including monitoring locations and frequency to verify
target disinfectant residual is being achieved throughout the building water system(s) including post-remediation flushing to confirm disinfectant residual concentrations are below the maximum allowable level in accordance with Safe Drinking Water Act (SDWA) Standards.

vi. **Scheduling:** Tentative scheduled dates of all remediation activities

vii. **Remediation Team:** Identification of individuals, vendors or other personnel responsible for implementation of all remediation measures.

c. The facility is responsible for all costs associated with remediation activities.

d. Refer to NJDOH’s [Chemical Shock Remediation Guidance for Building Water Systems](#) before developing and implementing a remediation of a potable water system.

6. **Post-Remediation Environmental Sampling**

a. Facilities must assess the efficacy of any chemical remedial measure by conducting post-remediation environmental samples for *Legionella* testing.

b. Post-remediation sampling should occur within 3 to 7 days after completion of the remediation (no sooner than 48 hours after the system returns to normal operating conditions).

c. For potable water systems, the facility shall collect environmental samples for *Legionella* testing at 2-week intervals (bi-weekly) for 3 months. If *Legionella* is not detected during 3 months of bi-weekly environmental sampling and results show control of *Legionella* bacteria in the building water system(s), collect environmental samples monthly for additional 3 months. The facility shall not transition to monthly sampling without first consulting with their LHD and NJDOH.

d. Sampling plan must at minimum include representative locations as specified in Environmental Sampling section of this chapter (Section 4, Paragraph b). In addition, previously reported sampling locations with *Legionella* detection shall be included in all subsequent sampling events until three consecutive non-detect *Legionella* culture results are obtained for the location.

e. Repeat remediations, with consideration for use of a higher concentration of disinfectant, may be warranted if *Legionella* continues to be detected. Any additional remediation required will reset the schedule of environmental sampling for *Legionella* testing (i.e., begin to collect environmental samples at 2-week intervals for 3 months) and all environmental sampling shall be collected 3 to 7 days from completing the remediation.

f. 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, new cases of Legionnaires’ disease, or suboptimal performance of the Water Management Program.
Facilities must share all environmental sampling results with the LHD within 24 hours of receipt. LHDs are responsible for following up with facilities to determine when environmental sampling is to occur and when results are expected.

Refer to NJDOH’s Guidance for Responding to Environmental Legionella Detections Following a Chemical Shock Procedure of a Potable Water System During an Outbreak Investigation.

7. Conclusion of Outbreak Investigation
   a. 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:
      i. No new cases of Legionnaires’ disease identified during a period of careful monitoring for new cases
      ii. No new cases of Legionnaires’ disease following implementation of long-term Legionella control strategies as part of a Water Management Program
      iii. No detection of Legionella in post-remediation environmental samples
   b. An effective Water Management Program to prevent ongoing transmission of Legionella must be in place before an outbreak is considered concluded.
   c. The LHD will issue a written notification to the facility when the outbreak investigation is considered concluded. NJDOH can provide template letters upon request.
   d. Public health authorities can extend the timeframe for enhanced environmental and clinical surveillance following an outbreak at any point if there is concern for the potential for ongoing transmission of Legionella. Concerns about the potential for ongoing transmission would be based on factors such as Legionella-positive environmental cultures, new cases of Legionnaires’ disease, or suboptimal performance of the Water Management Program.

GUIDANCE FOR INVESTIGATION RECOMMENDATIONS FOR A SINGLE FACILITY

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

- Interim recommendations and other immediate control measures
- Emergency remediation recommendations
- Notification recommendations
- Routine water management recommendations (“Best Practices”)
NJDOH will assist LHDs to determine which recommendations are applicable. Please note that the following recommendations are a general overview and should not be considered exhaustive.

**Interim Recommendations**

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

**Interim recommendations applicable to healthcare settings:**

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

Chemical shock remediations are considered a temporary measure to quickly reduce the risk of *Legionella* growth and transmission during an outbreak investigation. When performing a remediation, it is important to identify and address the root cause(s) of *Legionella* growth to minimize the risk of the bacteria rebounding, which can occur in as little as a week following a remediation. If *Legionella* continues to be identified in any samples following a remediation, regardless of species or concentration, the Water Management Program and specified control measures must be re-evaluated immediately. Identification of any *Legionella* species is evidence that the building water system is conducive for *Legionella* growth.

Facilities should work closely with their *Legionella* water treatment consultant to thoroughly review their Water Management Program activities and implement corrective actions to address any identified deficiencies. Examples of corrective action plans include, but are not limited to:

- Ensure all water system equipment are adequately cleaned immediately before the remediation (e.g., backflow preventers, in-line filtration including strainers, water heaters, heat exchangers, storage tanks, mixing valves, expansion tanks, filters, conditioners, recirculation pumps, etc.). Contact the manufacturer if instructions for removal of debris or sediment are not provided.

- Review water quality parameters throughout the building water system, including at all locations that were sampled during *Legionella* testing and locations routinely monitored for water quality parameters as part of the Water Management Program. Further investigate locations where water quality parameters are out of target range (e.g., review flushing log for outlet, inspect outlet for signs of a localized issue such as low water pressure or flow rate, leaking fixture or faulty mixing valve, and possible cross-connections nearby, assess water quality parameters at adjacent areas to determine the extent of the issue).

- Review the list of all outlets in the building (e.g., sinks, showers, tubs, janitorial sinks, eye wash stations, etc.) and re-evaluate how often each is used. Ensure that all unused or infrequently used outlets are flushed at least once a week (or twice per week for healthcare facilities). Outlets with *Legionella* detections may need to be flushed more frequently.

- Assess the building water system for areas of low flow or balancing issues. Ensure these areas are flushed more frequently and hire a consulting engineer to correct the issue.
Repeat remediations may be warranted to reduce the burden of biofilm in the system if *Legionella* continues to be detected. Any additional remediation required will reset the schedule of environmental sampling for *Legionella* testing (i.e., begin to collect environmental samples at 2-week intervals for 3 months).

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 continue to thoroughly flush the water from the system to replace with fresh water, to ensure *Legionella* does not recolonize the system. Consider flushing primary water pipes (e.g., risers, horizontal loops) to speed up 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.
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: PreventLD@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 initial conference call. 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.
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)
   ☐ Office building
   ☐ Manufacturing facility
   ☐ Restaurant
   ☐ Other ________________________________________________________________

3. Total number of buildings on campus: ________  Total number of buildings patient(s) was exposed: ________

4. Total number of floors including basement levels: ________

5. Total number of patient rooms, residential apartments/units or hotel guest rooms: ________

6. Total number of rooms (e.g., patient rooms, hotel rooms) or apartments/unit that can be occupied overnight: ________
7. Average length of stay for occupants (check one):
   - 1 night
   - 2–3 nights
   - 4–7 nights
   - >7 nights

8. Can windows in patient/guest/tenant rooms be opened? ✗ YES ✗ NO

9. Does occupancy vary throughout the year? ✗ YES ✗ NO

   If YES, seasons with lowest occupancy (check all that apply):
   - Winter
   - Spring
   - Summer
   - Fall

10. Are any occupant rooms or floors taken out of service during specific parts of the year, e.g., low season?
    ✗ YES
    ✗ NO

    If YES, which rooms or floors?

11. 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?

12. Describe any interventions taken as a result of prolonged, reduced occupancy or a building closure (e.g., regular flushing, hyperchlorination):

13. 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

14. 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:

51
15. Does the facility have a water safety plan or *Legionella* prevention program?
   - YES  - NO

   If YES, does the facility ever test for *Legionella* in water samples?
   - YES  → If yes, include copies of results
   - NO

   If YES, please describe the plan briefly here (does it include clinical disease surveillance and/or environmental *Legionella* surveillance?) and **attach a written copy** of the program policy:

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

<table>
<thead>
<tr>
<th>Building Name</th>
<th>Original Construction</th>
<th>Later Construction</th>
<th>Stories or Levels</th>
<th>Occupancy Rate (%)</th>
<th>Daily Census (Average) #/day</th>
<th>Use (List all types of uses)</th>
</tr>
</thead>
<tbody>
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</table>
# Water Supply Source

17. 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 ______________________

18. 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:
     __________________________________________________________
     __________________________________________________________
     __________________________________________________________
     __________________________________________________________

19. Does the facility monitor incoming water parameters (e.g., residual disinfectant, temperature, pH)?
   - YES  
   - NO  
   - If yes, include copies of the logs
   - NO

# Premise Plumbing System

20. Are cisterns and/or water storage holding tanks used to store cold potable water?
   - YES  
   - NO

21. Are there water softeners used on incoming water?
   - YES  
   - NO
   - If YES, are they installed on the hot, cold, or both water systems:
     __________________________________________________________
22. Are water filters used?
   - YES  - NO
   If YES, are they installed on the water system centrally (whole system filtration) or at points of use?:

   Filter type (e.g., purpose) and manufacturer/model:

23. What type of heating system is used for potable hot water? (Check all that apply)
   - Instantaneous heater (e.g., tankless coils, plate-frame, shell-tube, or tube-in-tube heat exchangers)
   - boilers or heaters with direct or in-direct hot water storage tanks
   - Other (describe):

24. Are expansion tanks used on the building’s hot water system?
   - YES  - NO
   If YES, how many? __________
   IF YES, are they a flow through design or do they have a drain valve? - YES  - NO

25. Is there a hot water return recirculation system (a system in which water flows continuously through the piping to ensure constant hot water to all endpoints) for the hot water?
   - YES  - NO
   If YES, please describe where it runs and delivery/return temperatures if they are measured:

26. Are there centralized thermostatic mixing valves (TMV)?
   - YES  - NO
   If YES, how many TMVs are utilized for the hot water system: ________________

27. Are there point of use TMVs?
   - YES  - NO
   If YES, describe where they are located (ideally, point of use TMVs are close to the point of use such as showers, and faucets):


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

<table>
<thead>
<tr>
<th>Building / System Name</th>
<th>Type of System (e.g., instantaneous heater, water heater with a storage tank, solar heating)</th>
<th>Name of System (e.g., Boiler #1, Loop #1)</th>
<th>Areas Served (e.g., rooms, floors)</th>
<th>Date of Installation</th>
<th>Make and Model</th>
<th>Total Capacity (Gallons)</th>
<th>Usual Temperature Setting, prior to TMV (°F)</th>
<th>Distal Outlet Temperature (°F)</th>
</tr>
</thead>
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</tbody>
</table>
29. What is the maximum hot water temperature at the point of delivery permitted by state / local regulations?
   ______ °F or ______ °C

30. What is the temperature set point for the heaters or boilers (pre-mixing valve/pre-tempered at source of hot water generation):
   ______ °F or ______ °C

31. What is the temperature set point for the hot water storage tanks, if applicable: ______ °F or ______ °C

32. What is the temperature set point for the hot water distribution (post-mixing valve) to point of use outlets:
   ______ °F or ______ °C

33. Are hot water temperatures ever measured by the facility at the points of use outlets?
   ❑ YES ➔ If yes, attach copies of the temperature logs
      If YES, what is the lowest documented hot water temperature measured at any point within the facility?
      ______ °F or ______ °C documented on (Month/Date/Year) ______/______/______
   ❑ NO

34. 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 highest documented cold-water temperature measured at any point within the facility?
      ______ °F or ______ °C documented on (Month/Date/Year) ______/______/______
      AND what is the typical cold water temperature measured within the facility in the summer?
      ______ °F or ______ °C
   ❑ NO

35. 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: ____________________ (mg/L or ppm) Winter: ____________________ (mg/L or ppm)
   ❑ NO

36. Does the facility have a supplemental disinfection system for long term control of Legionella or other microorganisms?
   ❑ YES
   ❑ NO
   If YES, obtain SOPs for routine use and maintenance as well as maintenance logs and records of disinfection levels, and complete the table:
37. Does the facility have any electronic or sensor faucets at points of use?
☐ YES  ☐ NO
If YES, where: _______________________________________________________________________________

38. Does the facility have any metering faucets or shower systems (e.g., push button design)?
☐ YES  ☐ NO
If YES, where: _______________________________________________________________________________

39. Does the facility have ice machines?
☐ YES  ☐ NO
If YES, list manufacturer, model, cleaning procedures and frequency:
___________________________________________________________________________________________
___________________________________________________________________________________________
___________________________________________________________________________________________

40. 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.
___________________________________________________________________________________________
___________________________________________________________________________________________
___________________________________________________________________________________________
___________________________________________________________________________________________
___________________________________________________________________________________________
___________________________________________________________________________________________
41. Does the facility have emergency fire protection system?
   - YES
   - NO → If no, skip to Q.36

   If YES, is this a wet or dry system?
   - Wet
   - Dry

   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)?

   _____________________________

   If YES, are these systems regularly tested (i.e., sprinkler head flow tests)?
   - YES
   - NO

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

42. 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? ________________________________

43. Are there any cooling towers or evaporative condensers on the facility premises?
   - YES → If yes, also complete Appendix C.
   - NO

44. Are there any hot tubs, whirlpool spas, or hydrotherapy spas on the facility premises?
   - YES → If yes, also complete Appendix D.
   - NO

45. Are there any decorative fountains, misters, water features, etc. on the facility premises?
   - YES → If yes, also complete Appendix E.
   - NO
46. 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:  
___________________________________________________________________________________________  
___________________________________________________________________________________________  
___________________________________________________________________________________________

47. Does the facility have a landscape irrigation or sprinkler system?  
☐ YES  ☐ NO  
If YES, describe their location and operation, including backflow prevention:  
___________________________________________________________________________________________  
___________________________________________________________________________________________  
___________________________________________________________________________________________
1. Type of healthcare facility (check all that apply):
   □ Acute care hospital
   □ 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 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. 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 the new building space?
   ☐ YES ☐ NO
   If YES, what period of time passed between flushing and when the building was occupied?

   __________________________________________________________________________________________

__________________________________________________________________________________________
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? □ YES □ NO
   Automatic dosing by chemical controllers? □ YES □ NO

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

5. Are disinfectant levels monitored? □ YES □ NO
   How often and by whom?

6. Are chemical metering pumps properly maintained and in good condition? □ YES □ NO

7. Scale and/or corrosion inhibitors used? □ YES □ NO
   Schedule of adding scale and corrosion inhibitors (e.g., daily, weekly, as needed):

8. Describe the scale/corrosion inhibitor dosing system.
   Hand fed? □ YES □ NO
   Automatic dosing by chemical controllers? □ YES □ NO

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

10. Is Legionella testing ever performed on the cooling tower?
    □ YES □ NO
    How often and by whom?

11. Is the cooling tower turned off at any time? □ YES □ NO
    If yes include schedule:

12. Are there start-up and shut-down procedures for the cooling tower? □ YES □ NO
    If YES, describe:

13. 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:
14. When was the cooling tower last cleaned? ________________________________________________________

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

________________________________________________________
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 disinfected:

<table>
<thead>
<tr>
<th>Hot Tub Questions</th>
<th>Hot Tub #1</th>
<th>Hot Tub #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot Tub Descriptor/Location</td>
<td></td>
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<tr>
<td>(e.g., main, private room #)</td>
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<tr>
<td>Indoor or Outdoor</td>
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<tr>
<td>Max. bather load</td>
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<tr>
<td>Filter type</td>
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<tr>
<td>$S = $sand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$DE = $diatomaceous earth</td>
<td></td>
<td></td>
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<tr>
<td>$C = $cartridge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date filter was last changed</td>
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<td></td>
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<tr>
<td>Frequency of filter/filter media replacement</td>
<td></td>
<td></td>
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<tr>
<td>Date of last filter backwash</td>
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<td></td>
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<tr>
<td>Frequency of filter backwash</td>
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<tr>
<td>Compensation tank present?</td>
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<tr>
<td>Type of disinfectant used</td>
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<tr>
<td>(include chemical name, formulation, and amount used)</td>
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<tr>
<td>Current measured disinfectant level</td>
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<tr>
<td>(e.g., free chlorine, bromine) (ppm)</td>
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<tr>
<td>Current measured pH</td>
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<tr>
<td>Method used for adding disinfectant</td>
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<tr>
<td>(e.g., automatic feeder, by hand)</td>
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<tr>
<td>Method used for monitoring and maintaining disinfectant and pH levels</td>
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<tr>
<td>(e.g., automatic controllers)</td>
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<tr>
<td>Date last drained and scrubbed</td>
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<tr>
<td>Water replacement frequency</td>
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<tr>
<td>(e.g., complete drain and refill)</td>
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</table>
Appendix E. Other Water Devices

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

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

This protocol describes how to take standard biofilm swab, bulk water, and filter samples from commonly sampled sites.

During an outbreak investigation, sampling should only be performed after a thorough environmental assessment has been done and a sampling plan has been made. Samples are typically collected by a third-party consultant hired by the facility; however, if the Local Health Department has additional resources, they may wish to collect the samples.

Health and Safety Considerations

The facility should be notified in advance to turn off (but do not drain or disinfect) any aerosol-generating devices to minimize the risk to the sampling team. Persons at an increased risk of developing Legionnaires’ disease if exposed to *Legionella* (e.g., immunocompromised individuals) should not accompany the sampling team.

*Optional personal protective equipment (PPE):*

Gloves are useful for sampling whirlpool spa filters or other sites that may be heavily contaminated with organic material.

Wearing a half-face air-purifying respirator equipped with an N95 filter may be appropriate in the following situations:

- when sampling cooling towers if the fans cannot be turned off, or
- in enclosed spaces with an aerosol-generating device that cannot be turned off.

Respirators must be used in accordance with a comprehensive respiratory protection program, which includes fit testing, training, and medical clearance ahead of their use (see OSHA standard 29 CFR 1910.134). For more information about N95 respirators, visit the National Institute for Occupational Safety and Health (NIOSH) website.

*Other occupational hazards*

While inadvertent exposure to *Legionella* pathogens may seem to be the primary risk, the more commonplace hazards of slips and falls, cuts and abrasions on corroded equipment, and electrical shocks are more likely.

The inspector should take measures to avoid slips, trips and falls, electrical hazards, and overhead hazards. Non-slip shoes, goggles, nitrile gloves, and a hard hat may be appropriate when entering a cooling tower to collect samples. Avoid wearing ties or other loose clothing that may become caught on nearby machines or surfaces. Be aware of inadvertent exposures to cleaning or water treatment...
chemicals often used and stored in and around cooling towers. The inspector should always be conscious of wasps, hornets, bees, and other stinging insects that often build nests near roof top mechanical equipment.

**Materials Needed**

- Sterile plastic 1-liter (1000 mL) bottles
- Sterile plastic 15 mL screw top tubes
- Disposable Dacron/polypropylene-tipped swabs with wooden or plastic stems
- Labels for bottles and tubes
- 0.1N solution of sodium thiosulfate
- Pipettes and bulbs
- Sterile plastic 500 mL or 1 L bottle
- pH test kit
- Chlorine test kit able to detect chlorine level below 2 ppm and up to 10 ppm
- Thermometer
- Sample data sheet and pens
- Large cooler(s), preferably with wheels for transportation
- Packaging supplies if samples are being mailed
- Biohazard waste bags (useful for collecting trash)
Sample Collection Methods for Building Water Systems

1. Biofilm Swabs
   a. If collecting biofilm swabs, they should be collected prior to collecting a bulk water sample.
   b. Request facility maintenance personnel to remove the showerhead and/or faucet aerator.
   c. Turn off the water for a couple of seconds to moisten the pipe, and then turn it off. Insert a sterile Dacron- or polypropylene-tipped swab deep into the faucet/pipe. Try to get beyond the bend and swab around the inside surface firmly without breaking the swab stem. (If there is visible biofilm on the inside of the showerhead or faucet aerator when these are removed, they can also be swabbed.)
   d. Place the swab into a 15 mL sterile plastic tube and add 3–5 mL of water from the same faucet to keep the swab tip moist during transport. Snap the wooden or plastic swab stem approximately 1 in. from the top of the tube. Add a drop of 0.1N sodium thiosulfate solution to neutralize residual disinfectants. Tighten the tube top to prevent leakage. Label the tube with a unique identifier. Record the type and location of the sample on a Sample Data Sheet.

2. Bulk Water Samples
   a. Place a sterile 1-liter bottle under the fixture and turn on the hot water to fill the bottle, leaving a 1 inch space at the top.
   b. Add 0.5 mL of 0.1N sodium thiosulfate solution to the water sample to neutralize residual disinfectants. Tighten the bottle top to prevent leakage. Label the bottle with a unique identifier. Record the type and location of the sample on the Sample Data Sheet.

3. Measure Water Quality Parameters
   a. Run the hot water until it is as hot as it will get.
   b. Collect 100–300 mL of water in a separate plastic sampling bottle. The same bottle can be used for measuring water parameters at every sampling site.
   e. Measure pre-flush and post-flush water quality parameters, at minimum measure temperature, pH, disinfectant level (free chlorine), and time to temperature stabilization of the sample. Post-flush water quality parameters must be measured after flushed water temperature has stabilized and record the time it takes for water temperature stabilizes as mentioned above as “time to temperature stabilization.” All water quality parameters must be measured on the Environmental Sample Data Sheet. Note, locations where it takes more than a minute for the water to get hot and stabilize could indicate a local problem such as a faulty mixing valve, or a system-wide hydraulic imbalance.
Sample Collection Methods for Whirlpool Spas

1. Biofilm Swabs
   a. Collect biofilm swabs from inside several jets and at the water line.
   b. Place each swab into a 15 mL sterile plastic tube (one swab per tube) and add 3–5 mL of water from the whirlpool spa tub to keep the swab tip moist during transport. Snap the wooden or plastic swab stem approximately 1 in. from the top of the tube. Add a drop of 0.1N sodium thiosulfate solution to neutralize residual disinfectants. Tighten the tube top to prevent leakage. Label each tube with a unique identifier. Record the type and location of the sample on a Sample Data Sheet.

2. Bulk Water Samples
   a. If the whirlpool spa tub is not drained, collect a 1 L bulk water sample in a sterile 1 L bottle. If the pool is partially drained, a sterile 15 mL tube may be used to collect the remaining whirlpool water. If the spa has been completely drained, ask facility maintenance personnel for access to the compensation tank (for collection of overflow water) and take a bulk water sample from there.
   b. Add 0.5 mL of 0.1N sodium thiosulfate solution to neutralize residual disinfectants to the 1 L water sample. Tighten the bottle top to prevent leakage. Label the bottle with a unique identifier. Record the type and location of the sample on the Sample Data Sheet

3. Hot Tub Filter Samples
   a. It is very important to collect a filter sample from whirlpool spas. Request access to the filter (which is usually located in a separate maintenance room) from the facility maintenance personnel. Gloves should be worn due to heavy organic loads typically found in filters and the abrasive or caustic nature of some filter filling material. The methodology for filter sample collection depends on the filter type.
   i. Sand filters: Collect some sand and enough water from the filter to cover the sand and keep it moist. Collect 300–500 mL of water from the filter chamber into a sterile 1 L bottle. Use the same or a new bottle to scoop sand from the chamber and pour the sand into the bottle making sure that it is completely covered by water.
   ii. Cartridge filters: Cut a portion of the filter to fit inside a 1 L bottle and add enough water from the filter chamber to cover it and keep it moist.
   iii. Diatomaceous earth filters: Collect 300–500 mL of water from the filter chamber into a sterile 1 L bottle and use a sterile swab to scrape diatom powder from the grid. Place the powder into the bottle making sure that it is completely covered by at least 1 in. of water.
b. Add 0.5 mL of 0.1N sodium thiosulfate solution to the sample to neutralize residual disinfectants. Tighten the bottle top to prevent leakage. Label the bottle with a unique identifier. Record the type and location of the sample on the Sample Data Sheet.

4. **Measure Water Quality Parameters**

   a. Collect 100–300 mL of water from the whirlpool spa tub (or the compensation tank if drained) in a separate plastic sampling bottle.
   
   b. Measure temperature, pH, and free chlorine or bromine level of the sample.
   
   c. Record all measured data on the Sample Data Sheet.
## Potential Sampling Locations

<table>
<thead>
<tr>
<th>Sampling Locations</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Potable water</strong></td>
<td></td>
</tr>
<tr>
<td>Incoming water main where water enters the building</td>
<td>1L bulk water</td>
</tr>
<tr>
<td>Every well and water tower that supplies water to the building</td>
<td>1L bulk water</td>
</tr>
<tr>
<td>Every holding tank or cistern, at or near the bottom</td>
<td>1L bulk water</td>
</tr>
<tr>
<td>Centralized water heater</td>
<td>1L bulk water</td>
</tr>
<tr>
<td>Expansion tank for hot water</td>
<td>1L bulk water</td>
</tr>
<tr>
<td>Return line before the water is re-heated</td>
<td>1L bulk water</td>
</tr>
<tr>
<td>Proximal outlets (e.g., shower, tub faucet, sink faucet) from a representative number of rooms (e.g., patient rooms, bathrooms, common areas, janitor closets)</td>
<td>1L bulk water</td>
</tr>
<tr>
<td>Mid to distal outlets (e.g., shower, tub faucet, sink faucet) from a representative number of rooms (e.g., patient rooms, bathrooms, common areas, janitor closets)</td>
<td>1L bulk water</td>
</tr>
<tr>
<td>Distal outlets (e.g., shower, tub faucet, sink faucet) from a representative number of rooms (e.g., patient rooms, bathrooms, common areas, janitor closets)</td>
<td>1L bulk water</td>
</tr>
<tr>
<td>Every outlet from the case-patient’s room(s), both hot and cold samples</td>
<td>1L bulk water</td>
</tr>
<tr>
<td><strong>Cooling tower system(s)</strong></td>
<td></td>
</tr>
<tr>
<td>Make-up water (water added to replace water loss because of evaporation, drift, or leakage)</td>
<td>1L bulk water</td>
</tr>
<tr>
<td>Collection basin (pan integral with the cooling tower and designed to allow recirculation of the open-loop cooled condenser water to sump or pump suction line)</td>
<td>1L bulk water</td>
</tr>
<tr>
<td>Drift eliminators, fill, hot deck, distribution basin or other surfaces that remain wet with open-loop recirculating condenser water</td>
<td>1L bulk water/ 2 biofilm swabs</td>
</tr>
<tr>
<td>Other representative samples of the open-loop recirculating condenser water (e.g., circulation pumps, chillers, heat exchangers, bypass piping and valves, sampling ports, strainers, filtration system and other heat rejection devices)</td>
<td>1L bulk water</td>
</tr>
<tr>
<td><strong>Whirlpool spas</strong></td>
<td></td>
</tr>
<tr>
<td>Water in the tub</td>
<td>1L bulk water</td>
</tr>
<tr>
<td>Biofilm at the water line</td>
<td>2 biofilm swabs</td>
</tr>
<tr>
<td>Water jets</td>
<td>2 biofilm swabs</td>
</tr>
<tr>
<td>Filter</td>
<td>1L bulk water/filling</td>
</tr>
<tr>
<td>Compensation tank</td>
<td>1L bulk water</td>
</tr>
<tr>
<td><strong>Other sources</strong></td>
<td></td>
</tr>
<tr>
<td>Decorative fountains</td>
<td>1L bulk water</td>
</tr>
</tbody>
</table>

*The percentage of outlets to be sampled will be determined during the onsite environmental assessment. NJDOH typically recommends 10% of outlets, but this amount may be lowered for larger facilities.*
<table>
<thead>
<tr>
<th>Sample ID</th>
<th>Sample Location (Room or apt#)</th>
<th>Sample Description (Shower head, sink)</th>
<th>Water Type (Hot, cold, or non-potable)</th>
<th>Vol. (mL)</th>
<th>Sample Collection (First draw or post flush)</th>
<th>Sample Date/ Time</th>
<th>Water Quality Parameters Pre-Flush</th>
<th>Legionella Species Identification and Concentration (CFU/mL)</th>
<th>Notes (Alternate locations, location inaccessible, fixture inaccessible)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Temp</strong> (°F)</td>
<td><strong>pH</strong></td>
<td><strong>Disinfectant Residual (mg/L or ppm)</strong></td>
</tr>
</tbody>
</table>
CHEMICAL SHOCK REMEDIATION GUIDANCE FOR BUILDING WATER SYSTEMS

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. That bathroom doors are closed with exhaust fans operating 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.
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

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
- Notification letter template to incoming hotel/travel accommodation guests regarding a Legionnaires’ disease outbreak investigation

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 to general public audiences or healthcare facility staff.

- **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.
LETTER TO HEALTHCARE FACILITY RE: SINGLE POSSIBLE HAI-LD CASE

[Insert date]

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

On [date], [local health department] received a report of a patient who was at [facility name] with a laboratory-confirmed case of Legionnaires’ disease. This patient meets the criteria for possible healthcare-associated Legionnaires’ disease, given that they spent time at [facility name] during the 14 days prior to illness onset. We are not aware of any other case of Legionnaires’ disease associated with this facility in the past 12 months. If a second case of Legionnaires’ disease is identified at [facility name] within a 12-month period, the local and state health department will further investigate your facility as a potential source of Legionella exposure. Currently, we are providing this letter to you for your information only.

With this identification of a possible healthcare-associated Legionnaires’ disease at your facility, there is concern that the building’s water system(s) may be at risk of Legionella growth and transmission. 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 American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) has developed Standard 188-2021 “Legionellosis: Risk Management for Building Water Systems” which establishes minimum legionellosis risk management requirements for building water systems and ASHRAE Guideline 12-2020 “Minimizing the Risk of Legionellosis Associated with Building Water Systems” which provides information and guidance on the control of legionellosis associated with building water systems. These documents are available at www.ashrae.org.

Additionally, please review the recommendations below for minimizing risk of legionellosis within the facility:

- **Legionella Water Management Programs** are now an industry standard for healthcare facilities in the United States. For more information about Water Management Programs, visit [www.cdc.gov/legionella/WMPtoolkit].

- Centers for Medicare and Medicaid Services (CMS) released a memorandum that mandates CMS-certified healthcare facilities to have water management policies and procedures to reduce the risk of growth and spread of Legionella and other opportunistic pathogens in building water systems. 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 Legionnaires’ disease. The preferred diagnostic tests for Legionnaires’ disease are culture of lower respiratory secretions (e.g., sputum, bronchoalveolar lavage) 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 about Legionnaires’ disease is included with this letter [https://www.cdc.gov/legionella/downloads/fs-legionella-clinicians.pdf].

Please inform [LHD name] immediately if you learn of other potential Legionnaires’ disease 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]
LETTER TO HEALTHCARE FACILITY RE: PRESUMPTIVE HAI-LD CASE

[Insert date]

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

On [date], [LHD] received a report of a patient at [facility name] who meets the criteria for presumptive healthcare-associated Legionnaires’ disease, given that they were an inpatient at [facility name] for 10 or more days during the 14 days before onset of symptoms. Most people who develop Legionnaires’ disease were exposed to water containing Legionella bacteria sometime in the 14 days before illness onset. Identifying one presumptive healthcare-associated case of Legionnaires’ disease in this timeframe raises concern regarding the potential for ongoing transmission within your facility. [LHD] and the New Jersey Department of Health would like to begin an epidemiologic and environmental investigation, in consultation with infection control, building maintenance engineers, and risk management staff, to help ensure that they have minimized any ongoing risk for Legionella transmission.

The following steps will help identify all potentially healthcare-associated cases:

- Perform a retrospective record review of hospitalizations for the past 12 months to identify pneumonia cases that could have been healthcare-associated, and if so, determine if patients were tested for Legionella.

- Implement active clinical surveillance for [2–6 months; see the Active Clinical Surveillance section to learn more at www.cdc.gov/legionella/health-depts/healthcare-resources/cases-outbreaks.html#clinical-surv] following confirmation of the last possible or definite healthcare-associated case of Legionnaires’ disease. [Specify components of active clinical surveillance; see the Active Clinical Surveillance section for suggestions at www.cdc.gov/legionella/health-depts/healthcare-resources/cases-outbreaks.html#clinical-surv].

- Remind clinicians to test patients with healthcare-associated pneumonia who are at risk for Legionnaires’ disease. The preferred diagnostic tests for Legionnaires’ disease are both culture of lower respiratory secretions (e.g., sputum, bronchoalveolar lavage) on media that supports growth of Legionella and the Legionella urinary antigen test. A fact sheet about Legionnaires’ disease is included with this letter and available at: [www.cdc.gov/legionella/downloads/fs-legionella-clinicians.pdf].

Please inform [LHD] immediately if you learn of other Legionnaires’ disease diagnoses among patients, visitors, or staff in your facility.

[LHD] will follow up with you to schedule an appointment to visit your facility. Further information is available from the [HD and/or CDC website], or by calling the [HD name] information line, [phone number].

We appreciate the opportunity to work with you and your staff throughout this process. 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 TO TRAVEL ACCOMMODATION RE: SINGLE TRAVEL-ASSOCIATED LD 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:


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]
LETTER TO GUESTS WHO RECENTLY VISITED A HOTEL ASSOCIATED WITH AN OUTBREAK

[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]
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](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:


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]
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](https://www.cdc.gov/legionella/index.html).

Sincerely,

[Building point of contact]
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
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>

<table>
<thead>
<tr>
<th>Date and Time</th>
<th>Contact Outcome</th>
<th>Scheduled Call Back Date and Time</th>
<th>Communication Note</th>
</tr>
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</table>

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>

<table>
<thead>
<tr>
<th>Onset date</th>
<th>Symptom</th>
<th>Onset date</th>
<th>Symptom</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fever</td>
<td></td>
<td>Diarrhea</td>
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<tr>
<td></td>
<td>Cough</td>
<td></td>
<td>Nausea</td>
</tr>
<tr>
<td></td>
<td>Shortness of breath</td>
<td></td>
<td>Confusion</td>
</tr>
<tr>
<td></td>
<td>Chest pain</td>
<td></td>
<td>Body aches</td>
</tr>
<tr>
<td></td>
<td>Abdominal pain (stomach aches)</td>
<td></td>
<td>Headache</td>
</tr>
</tbody>
</table>

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:*

<table>
<thead>
<tr>
<th>Type of device</th>
<th>Location used</th>
<th>Date(s)</th>
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<tbody>
<tr>
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</tbody>
</table>

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:*

<table>
<thead>
<tr>
<th>Name of facility and location</th>
<th>Dates</th>
<th>Describe type of work and any possible exposures to water at work</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

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:*

<table>
<thead>
<tr>
<th>Describe exposure</th>
<th>Address of exposure</th>
<th>Dates of exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>
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:>

<table>
<thead>
<tr>
<th>Describe exposure</th>
<th>Address of exposure</th>
<th>Dates of exposure</th>
</tr>
</thead>
<tbody>
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</table>

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

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

<Ensure you specifically state that you are asking about exposures in the 14 days prior to becoming ill>

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

<table>
<thead>
<tr>
<th>Exposures</th>
<th>&lt;Check one:&gt;</th>
<th>Name and Address</th>
<th>Date(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K. Did you work/volunteer at, reside in, or visit a congregate living facility (e.g., correctional facility, shelter, dormitory)?</td>
<td>Yes</td>
<td>No</td>
<td>Not sure</td>
</tr>
<tr>
<td>L. Did you visit any travel accommodations such as a hotel, motel, resort, or air bnb?</td>
<td>Yes</td>
<td>No</td>
<td>Not sure</td>
</tr>
<tr>
<td>M. Did you spend any nights away from home?</td>
<td>Yes</td>
<td>No</td>
<td>Not sure</td>
</tr>
<tr>
<td>N. Did you use or go near a whirlpool or hot tub?</td>
<td>Yes</td>
<td>No</td>
<td>Not sure</td>
</tr>
<tr>
<td>O. Did you walk through or visit any playgrounds or parks?</td>
<td>Yes</td>
<td>No</td>
<td>Not sure</td>
</tr>
<tr>
<td>P. Did you visit or walk by any decorative fountains, such as a fountain in a mall?</td>
<td>Yes</td>
<td>No</td>
<td>Not sure</td>
</tr>
<tr>
<td>Q. Did you visit any transportation hubs such as a train station, bus terminal, or airport?</td>
<td>Yes</td>
<td>No</td>
<td>Not sure</td>
</tr>
</tbody>
</table>

*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/lelearn/prevent-LD-training.html

**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