Oregon *Legionella* Investigation Toolkit

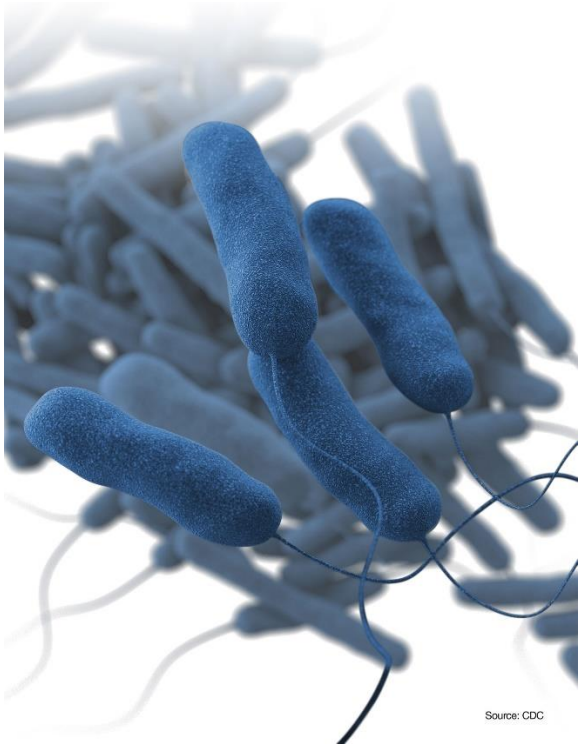

Image: https://www.cdc.gov/legionella/images/legionella-illustration-lg.jpg

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Introduction

Purpose and Scope

The purpose of the *Legionella* Investigation Toolkit is to provide clear guidance and procedures for determining incidents of legionellosis, whether the source of infection may be of major public health concern and preventing further transmission.

Disclaimer

The materials in this toolkit were prepared and are updated as of May 1, 2025. Major updates to the text are highlighted.

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.

These organizations continue to release updated recommendations and guidance regarding *Legionella*; please contact the Oregon Health Authority's Acute and Communicable Disease Prevention (ACDP) program if you have questions about updated resources or guidance.

Acknowledgments

We greatly appreciate the contributions to this document from several local, state, and federal partners listed below.

- Tennessee Department of Health, Communicable and Environmental Diseases & Emergency Preparedness
- New Jersey Department of Health, Infection Control, Healthcare, & Environmental Epidemiology Program
- New Hampshire Department of Human Services, Division of Public Health Services
- Oregon Health Authority: Acute and Communicable Disease Prevention, Drinking Water Program, Quality Improvement Program, and Healthy Waters Program
- Deschutes County Environmental Health
- Multnomah County Health Department
- Washington County Health and Human Services
- Josephine County Public Health
- Jackson County Health and Human Services

Roles And Responsibilities

Agencies	Roles and Responsibilities
Local Public Health Authority (LPHA) Communicable Disease (CD)	• Conducting disease surveillance/identifying cases. • Investigating cases and outbreaks. • Supporting local environmental health (EH) with the environmental assessment, if requested. • Collaborating with ACDP epidemiologists to review the facility's water management program. • Ensuring appropriate partners (e.g. Tribal Health Agencies, other State and Local Public Health Authorities, etc.) are notified and involved in the investigation.
Tribal Health Agencies	• Leading or collaborating with ACDP, LPHA CD and local EH on investigations as determined by the Tribe. • Roles and responsibilities may be shared among the agencies involved.
Acute and Communicable Disease Prevention (ACDP) Epidemiologist	• Supporting the LPHA CD with investigations. • Leading outbreak investigations when requested by the LPHA CD. • Reviewing the facility's water management program. • Reviewing the facility's environmental sampling plan when requested by the local EH. • Supporting local EH with conducting the environmental assessment if requested by the local EH. • Coordinating testing of clinical and environmental samples, including requesting approval for testing from CDC or the *Legionella* Reference Center (LRC). • Ensuring appropriate partners (e.g. Tribal Health Agencies, other State and Local Public Health Authorities, etc.) are notified and involved in the investigation.
Local Environmental Health (EH)	• Supporting the LPHA CD with investigations. • Recommending control and remediation measures. • Providing guidance on environmental assessment and sampling. • Conducting the environmental assessment. • Developing the environmental sampling plan. • Conducting environmental sampling or observing the environmental sampling if the facility conducts the environmental sampling. • Serving as a point of contact for the facility, which may include: communicating with the facility to ensure control measures are met, answering questions, providing reference materials/handouts, enforcing closure on licensed facilities involved in an outbreak or cluster, setting the environmental sampling schedule for the facility as a means to reopen or remain open, arranging environmental sampling, requesting

	the best time frame for environmental sampling, and obtaining permission for environmental sampling from unlicensed facilities.
Facility	• Developing, reviewing and updating the facility's water management program. • Developing the environmental sampling plan with the local EH. The facility may also conduct the environmental sampling under the observation of the local EH. • Implementing control and remediation measures in accordance with the facility's water management program and the recommendations of the local EH.
Private Laboratories	• Testing clinical specimens (antigen testing).
Oregon State Public Health Laboratory (OSPHL)	• Forwarding clinical specimens or isolates to CDC or the *Legionella* Reference Lab (LRC) if testing is approved.
Centers for Disease Control and Prevention (CDC)	• Testing clinical specimens from state public health laboratories and other federal agencies: culture, real-time polymerase chain reaction (PCR), molecular characterization. • Molecular characterization of clinical and environmental isolates.
Environmental *Legionella* Isolation Techniques Evaluation (ELITE) Laboratories	• Testing environmental samples or isolates.
Legionella Reference Center (LRC)	• Testing clinical and environmental specimens or isolates if approved: PCR, culture, subculture and identification. • Sending clinical and environmental isolates to CDC for molecular characterization if needed.
Environmental Consultants	• Some facilities may hire an environmental consultant to conduct the environmental assessment and sampling, to recommend control and remediation measures, to evaluate the effectiveness of these measures, and to develop the facility's water management program. • If a facility chooses to hire an environmental consultant, then LPHA CD, local EH, and ACDP will work with the consultant and the facility to coordinate the environmental assessment, sampling, recommendation and evaluation of control and

	remediation measures, and development of the facility's water management program.
Oregon Drinking Water Services	• Providing information about events that may have affected the drinking water system, including treatment interruptions, disruptions in service, construction or maintenance, changes in water quality, etc.

Reporting Requirements

Physicians are required to report a case or suspected case of legionellosis within one working day of identification or diagnosis. Laboratories are to report all test results indicative of and specific for legionellosis within one working day.

Definitions

- **Biofilm:** a thin layer or film of bacteria that adheres to surfaces.
- **Building Water Systems:** Potable and non-potable water systems in a building or on site.
- **Centralized Building Water System:** Any system that distributes water to multiple users or multiple locations within a building site.
- **Cluster:** Two or more people with Legionnaires' disease exposed to *Legionella* presumably at the same place and within a defined time period.
- **Control Measure:** a disinfectant, heating, cooling, filtering, flushing, or other means, method, or procedure used to maintain the physical or chemical conditions of water within control limits.
- **Corrective Action:** Action taken to return control values to within established limits. Corrective action is necessary when monitoring or measurements indicate control values are outside of established control limits.
- ***Legionella*:** The genus of bacteria that was subsequently identified as the pathogen that caused the 1976 outbreak of disease at the American Legion convention in Philadelphia. *Legionella* are common aquatic bacteria found in natural water and building water systems, as well as in some soils.
- **Legionellosis:** The term for Legionnaires' disease, Pontiac Fever, and any illness caused by *Legionella* bacteria.
- **Legionnaires' disease (LD):** Pneumonia caused by *Legionella* bacteria.
- **Monitoring:** conducting a planned sequence of observations or measurements of the physical and chemical characteristics of control measures.
- **Non-potable:** Water that is not safe for drinking or for personal or culinary use and that has the potential to expose users to *Legionella* and other pathogens.
- **Water Management Program (WMP)**: The risk management plan and activities for the prevention and control of legionellosis associated with building water systems, including documentation of the plan's implementation and operation.

Disease And Epidemiology

Legionellae are Gram-negative bacilli. At least 50 species and at least 70 serogroups have been identified.

L. pneumophila is responsible for >90% of *Legionella* infections. Eighteen serogroups of *L. pneumophila* are currently recognized; serogroup 1 causes the majority of legionellosis reported in the U.S.

Legionellae do not colonize the human respiratory tract. Legionellosis is more common in adults >50 years of age and very unusual in persons <20, most of those being immunosuppressed. It was first identified as the cause of the 1976 outbreak of pneumonia involving Pennsylvania State American Legion convention delegates, dubbed “Legionnaires’ disease” (LD) by the press, in which 221 people fell ill and 34 of them died. There are no reliable distinguishing clinical characteristics other than that the illness is primarily respiratory; diagnosis depends upon laboratory identification of the organism.

Illness is associated with three clinically and epidemiologically distinct syndromes:

- Legionnaires’ disease (LD), a potentially fatal form of pneumonia;
- Pontiac fever, a self-limited “flu-like” illness without pneumonia, named after a 1968 outbreak involving 144 persons in the county health department building in Pontiac, Michigan (the causative role of *Legionella* was appreciated following the 1976 outbreak of LD); and
- extrapulmonary legionellosis, infection in sites outside the lungs.

Persons with LD may present early in the illness with nonspecific symptoms including fever, malaise, myalgia, anorexia, and headache. Cough may be only slightly productive, and chest pain, occasionally pleuritic, can be prominent. Gastrointestinal symptoms, especially diarrhea, occurs in 20 to 40 percent of cases. Chest x- rays usually show a pneumonia. Pontiac fever is a milder, self-limited illness lasting 2–5 days. A diagnosis of extrapulmonary legionellosis is made when there is clinical evidence of disease at an extrapulmonary site and diagnostic testing indicates evidence of *Legionella* at that site. Manifestations have included endocarditis, wound infection, joint infection, and graft infections.

Persons at increased risk for legionellosis include the elderly, smokers, those with chronic diseases such as COPD or diabetes, and the immunosuppressed.

Environmental Conditions

Legionellae thrive in warm, aquatic environments, preferring temperatures of 77°–113°F, and they are relatively resistant to the effects of chlorine and heat. Multiple environmental factors

influence the growth of *Legionella* in potable water systems, including sediment and biofilm, water age, water temperature, and disinfectant residuals. Areas of stagnation or slow flow in a water system create favorable conditions for *Legionella* growth due to biofilm development, lower levels of disinfectant, and warmer water temperatures. Biofilms—thin layers of microorganisms, which can include multiple species of bacteria, fungi and amoebae, that adhere to surfaces in building water systems and devices—support *Legionella* growth by providing a source of nutrients and protection from disinfectant. Legionellae live and replicate in biofilms and within amoebae and ciliated protozoa, which act as hosts for Legionellae. *Legionella* can grow in parts of buildings' water systems, including water heaters, pipes, water storage tanks, and water filters, and then spread via devices that produce aerosolized water or water droplets, such as aerators, misters, humidifiers, showers, faucets, and respiratory therapy equipment. *Legionella* can also grow in and spread via cooling towers, fountains, hot tubs, ice machines and eyewash stations.

Clinical Diagnostic Testing

Laboratory tests to confirm the diagnosis of legionellosis are listed in the table below.

The preferred diagnostic tests for legionellosis are culture of lower respiratory secretions (e.g., sputum, bronchoalveolar lavage) on selective media (Buffered Charcoal Yeast Extract Agar [BCYE]) and the *Legionella* urinary antigen test. Best practice is to obtain both sputum culture and the urinary antigen test concurrently, ideally before antibiotic administration (but antibiotics should not be delayed facilitating specimen collection). The urinary antigen test may detect *Legionella* infections for days to weeks after treatment.

Serology and direct fluorescent antibody (DFA) tests are also available; however, they are not commonly used due to technical and collection difficulties. Serologic tests for antibodies are only diagnostic with a 4-fold or greater rise in antibody titer in paired (acute and convalescent) samples collected 4–8 weeks apart. Serologic testing is not recommended for clinical or public health purposes because of the delay inherent in convalescent testing.

TEST	SENSITIVITY	SPECIFICITY	ADVANTAGES	DISADVANTAGES
Urinary antigen	70–100%	95–100%	Rapid (same day)	Only detects *Legionella pneumophila* serogroup 1; does not allow for molecular comparison of clinical and environmental isolates

Polymerase Chain Reaction (PCR)	95–99%	>99%	Can be performed on pathologic specimens (e.g., lung tissue); rapid; possible to detect species and serogroups other than Lp1.	Assays vary by laboratory; may not be commercially available in the United States
Culture of lower respiratory secretions	20–80%	100%	Detects all species and subgroups; can compare clinical and environmental isolates	Technically difficult; slow to grow (>5 days); sensitivity dependent on technologic skill; requires BCYE agar

Communication

Reporting an outbreak

The LPHA should report suspected legionellosis outbreaks to ACDP, which will assign an outbreak number and ACDP epidemiologist(s) to support the LPHA in the outbreak investigation.

Communication with the facility, people at risk, other agencies and the public

A conference call should be scheduled with ACDP, LPHA CD, local EH, and the facility. During this call, ACDP, LPHA CD, local EH, and the facility should designate points of contact and develop a plan for sharing information and updates related to the investigation.

Consider developing a risk communications plan using the *CSTE* Legionnaires' Disease Risk Communication Toolkit as a guide. The toolkit is a comprehensive (>200 pages) document intended to help state, tribal, local, and territorial health agencies to communicate with key audiences. It has setting-specific modules for the following:

- Healthcare facilities
- Congregate residential facilities
- Hotels and hospitality facilities
- Community settings
- Routine environmental testing results in the absence of cases

The accompanying >150-page CSTE Legionnaires' Disease Risk Communication Toolkit Appendix includes templates and samples for letters to facilities and individuals, public health orders, health department advisories, and press releases. Please refer to pages A9–A12 of

the CSTE Legionnaires' Disease Risk Communication Toolkit Appendix for a complete list of available templates and samples.

Tribal Health Agencies

Oregon's nine federally recognized Tribes are sovereign nations and should be involved in any legionellosis investigation involving tribal members or facilities under tribal oversight. At the start of the investigation, it is important to communicate with tribal partners and specify roles and responsibilities to ensure appropriate collaboration.

Investigation Consultation

CDC offers consultations to health departments investigating potential outbreaks of legionellosis. To request epidemiologic or environmental health assistance, email travellegionella@cdc.gov.

General Considerations When Conducting Investigations

Case identification and interviewing cases

Case investigation should be initiated by LPHA CD staff within 1 working day after receiving a report of a single case of legionellosis. Before the interview, review the *Legionella* Investigative Guidelines. Case investigation should focus on basic demographics, clinical description, laboratory results, and risk factors. LPHA CD staff should complete the questions in the *Legionella* module in Orpheus in addition to completing the CDC's Extended Case Report Form for Legionellosis, which can be accessed from Orpheus, downloaded, filled out, and then attached to the documents tab of the Orpheus case record.

Cluster and outbreak surveillance

It is recommended that LPHA CD and ACDP staff regularly conduct retrospective reviews of cases in Orpheus to identify those with potential shared exposure sources, including water, healthcare settings, travel, residential/congregate living settings, and occupational exposures, within a 12-month period. If a cluster or outbreak is suspected, it is recommended that LPHA CD staff also conduct active case surveillance, if possible. ACDP staff can support retrospective and active case finding. For outbreak investigations in healthcare settings, CDC's recommended timeframe for retrospective and active case finding is the last 12 months and the next 6 months.

Gathering facility background information

Collect background information about the facility early in the investigation before conducting the environmental assessment to inform recommendations for immediate control measures. A sample background information form can be found in Appendix G: *Legionella* Investigation Facility Background Questionnaire. Background information should include:

- Facility Characteristics
  - Type of facility
  - Facility Water Management Program (WMP)
  - Environmental testing records for *Legionella*
- Building Information
  - Number of buildings
  - Purpose of each floor
  - Number of floors and rooms
  - Number of private and communal bathrooms
  - Type of heating and cooling
- Potable Water System
  - Source of cold-water supply
  - Number of distinct hot-water systems and areas served
  - Supplemental disinfection systems
  - Filters
- Water System Devices
  - Cooling towers
  - Fountains
  - Hot tubs and pools
  - Sprinkler systems
  - Safety showers and eye wash stations
  - Respiratory equipment, including nebulizers

Testing clinical and environmental specimens

Clinical specimens are often first tested by private labs using urine antigen testing. If urine antigen tests are used, follow-up culture of lower respiratory specimens is recommended for confirmation and molecular characterization (sequencing). CDC recommends collecting a lower respiratory specimen for culture as soon as legionellosis is suspected. OSPHL does not offer *Legionella* testing, so LPHA CD staff should work with ACDP and OSPHL to coordinate approval of testing and submission of clinical specimens and isolates to CDC or the LRC. If testing is approved by CDC or the LRC, private labs may be instructed by ACDP and OSPHL to send the approved specimens or isolates directly to CDC or the LRC for *Legionella* species detection and identification. Alternatively, private labs may be instructed by ACDP and OSPHL to forward specimens or isolates to OSPHL for processing; OSPHL will then forward

the approved specimens or isolates to CDC or the LRC. Cases cannot be linked to environmental sources without culture confirmation.

Environmental testing should be completed by a laboratory with a record of successful performance from a proficiency test program—for example, the Environmental *Legionella* Isolation Techniques Evaluation (ELITE) Program. ELITE member labs can be found on CDC's website using this link. The laboratory should also be accredited by a national program for environmental testing, such as The NELAC Institute (TNI). TNI accredited labs can be found using this link.

Opening and closing an outbreak

The threshold for opening a legionellosis outbreak varies by setting. See the Appendix C: Setting-Specific Criteria to Conduct Investigations for more information. When in doubt about whether an outbreak investigation is warranted, consult with an ACDP epidemiologist. Suspected outbreaks should be reported immediately to the ACDP epidemiologist on call.

The time frame for closing an outbreak will vary by outbreak. Generally, an outbreak can be considered over when there have been no new cases of legionellosis identified that can be linked to the exposure source within a given time period (2–6 months for healthcare-associated outbreaks) and there has been no detection of *Legionella* in environmental samples for 6 months after control measures have been implemented. Environmental sample collection should be repeated at least 48 hours after the water system or device has resumed normal operation.

Environmental Assessment and Sampling

Assessment

The purpose of the environmental assessment is to evaluate potential sources of *Legionella* exposure, including potable water sources (e.g., public utilities and private sources) and devices (e.g., cooling towers, hot tubs, pools, and fountains). The environmental assessment must be completed before sampling is initiated.

An environmental assessment will be scheduled with the facility and their environmental consultant (if applicable). Local EH staff typically conduct these assessments, but they can also be done by LPHA CD and ACDP staff. It is highly recommended that infection preventionists also participate in environmental assessments of healthcare settings.

Use CDC's *Legionella* Environmental Assessment Form (LEAF) along with the *Legionella* Environmental Assessment Form Marking Guide to conduct the environmental assessment.

Sampling

The purpose of environmental sampling is to identify potential sources of exposure and the degree of colonization which will inform where to focus control measures and remediation strategies. Sampling locations should include centralized building water system access points, aerosol-generating devices and a sample of rooms and areas in the facility.

ACDP, LPHA CD, local EH, the environmental consultant (if applicable) and the facility should collaborate on an environmental sampling plan based on the findings from the environmental assessment and available epidemiologic data. Typically, the facility and environmental consultant (if applicable) should create a sampling plan, and ACDP, LPHA CD, and local EH staff will review the plan and recommend changes if necessary.

If the facility is not licensed by local EH, then verbal or written consent from facility management may be needed before collecting environmental samples. Please refer to the template LN13, “Sample: Letter to a facility about testing water features (Nevada)” in the CSTE Legionnaires’ Disease Risk Communication Toolkit Appendix.

The cost of testing environmental samples, including post-remediation testing, should be covered by the facility. LPHAs and ACDP may have limited funds to cover a portion of testing if necessary. The LRC will test at no charge, but shipping costs will need to be covered. Please consult with ACDP if you have questions about testing costs.

Best Practices for conducting environmental assessments and sampling:

- Collaboration between local EH, LPHA CD, and ACDP is important for conducting assessments.
- Review the LEAF prior to conducting the environmental assessment.
- Coordinate with the laboratory to acquire sampling supplies and understand their time constraints. Samples usually need to be sent to the lab within 24 hours, and certain laboratories only test during specific days of the week.
- Consider time and day when samples will be collected. Mornings or other times when the facility may be less busy is ideal.
- Organize and ensure all supplies, including PPE, are available prior to conducting sampling.
- Obtain consent, preferably in writing, from the facility to collect samples.

Please refer to Appendix D: Master List of Resources, for additional resources for environmental assessment and sampling.

Control Measures

Water Management Program

A water management program (WMP) is a detailed document that outlines a facility's policies and procedures for limiting growth and spread of certain pathogens, including *Legionella*, in the building water systems.

The Centers for Medicare & Medicaid Services (CMS) requires healthcare facilities, including hospitals, critical access hospitals, and long-term care facilities, to develop a water management program that adheres to the guidelines published by the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE).

CDC has a toolkit for Developing a *Legionella* Water Management Program intended for building owners and management who need assistance creating their own WMP. CSTE also has a Water Management Program Template available, as well as an Evaluation Tool to help determine if a facility's WMP adheres to the ASHRAE guidelines and CDC's toolkit.

Immediate Control Measures

Immediate control measures are recommended to prevent exposure to suspected sources of *Legionella* and to reduce risk of continued transmission. Immediate control measures should be based on the initial findings of the environmental assessment, and specific to the suspected source, building and outbreak.

Refer to CDC's Toolkit for Controlling Legionella in Common Sources of Exposure, which provides control measures for commonly implicated sources. The toolkit includes resources for the following sources:

- Potable water systems
- Cooling towers
- Fountains
- Hot tubs
- Other devices
- Healthcare facilities

Remediation

If the control measures implemented during a *Legionella* investigation are not sufficient to reduce the growth and transmission of *Legionella* within a building water system or device, then remediation is recommended. Remediation activities should also be considered if *Legionella* is detected during routine environmental testing and as a preventive measure

following any disruptions in the water system. Remediation methods may include: hyperchlorinating (chemical shock) the potable water system, draining and scrubbing devices, or superheating and flushing a device. ASHRAE does not recommend superheating potable water systems.

Remediation methods should be selected based on the results of the environmental assessment and sampling, as well as the epidemiologic findings from the investigation. Refer to CDC's Toolkit for Controlling Legionella in Common Sources of Exposure.

Post-Remediation Strategies and Environmental Sampling

The effectiveness of the control measures and remediation efforts should be assessed by testing post-remediation environmental samples. A common approach outlined in the HICPAC Guidance (Recommendations of CDC's Healthcare Infection Control Practices Advisory Committee for preventing healthcare-associated pneumonia) is to collect samples for culture at least 48 hours after restoring water systems or devices to their normal operating conditions; at 2-week intervals for 3 months; and then at monthly intervals for 3 more months. If *Legionella* is detected during follow-up environmental sampling, then the WMP should be re-reviewed and additional remediation strategies implemented. Environmental sampling should then continue for 6 more months.

Setting-Specific Considerations When Conducting Investigations

Community Clusters

Community clusters of legionellosis can be difficult to detect because they often do not begin with a known common exposure at the onset. In the absence of a marked spike in cases or abnormal geographic clustering, many community clusters may go undetected.

In the United States, community outbreaks are most often linked to cooling towers. However, factors such as changes in water sanitation, seasonal weather variations, and other factors may be associated with community legionellosis outbreaks.

Due to difficulty in detecting community clusters, maintaining a high index of suspicion is essential. Each case should be investigated as indicated in "General Considerations When Conducting Investigations." If there is *any* concern that the patient may be part of a larger cluster, ACDP and the LPHA CD should also consider using CDC's Community Line List Template to collect information that could be associated with community exposures.

Additional surveillance practices, such as utilizing geographic information systems (GIS; mapping) can be helpful in routine monitoring for community clusters and outbreaks.

A full investigation should be considered when case counts exceed expected levels in a geographic area. This may include:

- Two or more cases who reside or work in close geographic proximity, or
- Two or more cases with a common community exposure (same gym, pool, grocery store, worksite, etc.)

For full investigation steps, see Appendix A. Investigation Flowchart and Appendix B. One-Page Checklist for LPHAs to Conduct Full Investigations.

At a minimum, if two or more cases who reside or work in close geographic proximity or have a common community exposure are identified, then retrospective and active case surveillance should be considered for the past 12 months and the next 2–6 months. In addition, if two or more cases with a common community exposure are identified, then a notification letter should be sent to the facility, and ACDP, LPHA CD, and local EH staff should consider conducting an environmental assessment and testing environmental samples.

Because outbreaks of legionellosis are often associated with cooling towers, when investigating multiple cases who reside or work in close geographic proximity or share a common community exposure, ACDP, LPHA CD, and local EH staff should consider locating any cooling towers in the area of the possible exposure location using the techniques outlined in *Strategies for Identifying Cooling Towers*.

Water Utilities Programs

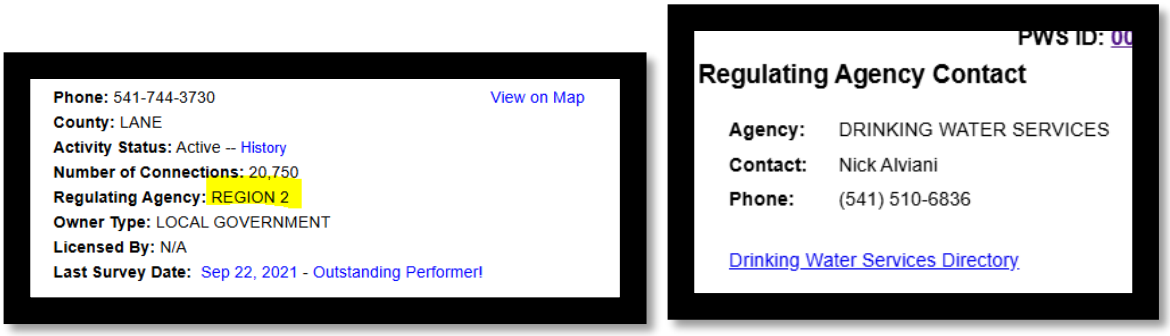
Background and role of water utility provider

If you suspect that the public water system may be a source of *Legionella*, it is important to work with the water utility provider during the investigation.

Speak with your local EH drinking water professional and request assistance identifying contact information for the regulator and system operator. The regulator should be contacted before the system operator. Local EH drinking water professionals should keep their State Drinking Water Services (DWS) colleague informed of the situation regardless of who is the assigned regulator.

If your local EH drinking water partner is not available, water systems and regulators can be looked up using the Drinking Water Data Online tool. The tool can be used to search Oregon water systems by name, number, or location. This page will contain the water system operator's contact. On this page the link next to the "Regulating Agency" heading will bring you to a contact page for the regulator(s).

Below are screenshots from the Drinking Water Data Online tool:



Ask the drinking water regulator(s) about:

- Treatment interruptions
- Disruptions in service: water main breaks, pressure drops, advisories
- Recent construction or maintenance
- Information on dead ends and flushing practices
- Any reported changes in water quality
- Building closures or partial closure of a building having no water use (stagnant water in pipes)

Testing

Arrange to take one-liter bulk water samples from the source and throughout the distribution system. It may be necessary to take swab samples in addition to collecting water.

Travel-associated Cases

A case who reports spending at least one night away from home (hotel, cruise ship, rental) during the 14 days before illness onset is presumed to be a travel-associated case until proved otherwise.

Each case should be investigated as indicated in "General Considerations When Conducting Investigations." Gather information for each accommodation visited during the exposure period, including name, address, room numbers, and dates of stay. If the accommodation is in Oregon, notify the local EH where the establishment is located.

CDC will notify Oregon's state *Legionella* coordinator if a case from another jurisdiction stayed in Oregon. When notified, let the LPHA know of the case. CDC regularly checks accommodations from reported *Legionella* cases.

If there have been additional cases among travelers to the hotel, cruise ship or other public accommodation in the past 12 months, then a full investigation is warranted. If 2 or more cases identified the same hotel or accommodation within a 12-month period, a notification letter should be sent to the establishment.

See Appendix A. Investigation Flowchart and Appendix B. One-page Checklist for LPHAs to Conduct Full Investigations. Consider using CDC's Travel Line List Template to collect information that could be associated with travel.

If a case reports spending at least one night on a cruise ship during the 14 days before symptom onset, consider also completing CDC's Cruise Ship Questionnaire Template.

Healthcare-associated Cases

A case of legionellosis reporting exposure to a healthcare facility during the 14 days before illness onset is considered a healthcare-associated case. Healthcare-associated cases should be investigated as indicated in "General Considerations When Conducting Investigations." Please refer to Appendix C. Setting-Specific Criteria to Conduct Investigations to determine when it is appropriate to conduct a full investigation after identifying a healthcare-associated case.

Healthcare facilities often serve patients at an increased risk for legionellosis (people >50 years of age, current or former smokers, people with weakened immune systems or chronic disease) and utilize large, complex water systems, which can be subject to *Legionella* growth and proliferation. If an effective water management program is not in place, healthcare facilities may put people at risk for legionellosis. Rapid reporting and response to healthcare-associated cases can help identify and mitigate *Legionella* risk in the healthcare setting.

If a case reports exposure to a healthcare facility (hospital, long-term care, clinic), first identify the type of exposure (inpatient, outpatient, visitor or volunteer, employee) and duration of exposure. For healthcare exposures of short duration (e.g., routine clinic visit), consider potential water exposures during the visit (e.g., fountains, endoscopy, dental cleaning and treatments with water). If potential water exposures are identified, consider notifying the facility. For cases with overnight or inpatient healthcare exposures or outpatient exposures of long duration (e.g., dialysis, infusion) determine whether they are a possible or presumptive healthcare-associated case:

- Presumptive healthcare-associated legionellosis: A case with ≥10 days of continuous stay at a healthcare facility during the 14 days before onset of symptoms.
- Possible healthcare-associated legionellosis: A case who spent some period of time <10 days during the 14 days before date of symptom onset in one or more healthcare facilities.

Conduct a full investigation if there are 1 or more cases of presumptive healthcare-associated legionellosis at any time or 2 or more cases of probable healthcare-associated legionellosis within a 12-month period.

Promptly notify ACDP's Healthcare Associated Infections (HAI) Program since their Regional Infection Preventionists (IPs) can offer infection prevention consultation and resources pertaining to respiratory equipment and medical devices. Regional IPs can also support environmental assessments as needed.

For more information about the steps in a healthcare-associated investigation, see Appendix A. Investigation Flowchart, Appendix B. One-Page Checklist for LPHAs to Conduct Full Investigations, and Appendix C. Setting-Specific Criteria to Conduct Investigations.

Additional case finding

During a full investigation, it is recommended that healthcare staff also conduct additional case finding, including retrospective chart review and active clinical surveillance. State and LPHA staff can support facilities with these steps as requested.

Steps in retrospective case finding should include:

- Assess routine practices
    - Does the facility regularly monitor for patients with healthcare-associated pneumonia[1] as part of their communicable disease surveillance program? Does the facility test for *Legionella* in patients who have been identified as having healthcare-associated pneumonia?
    - What tests does the facility use to test patients for *Legionella*?
- Conduct retrospective chart review
    - Review charts of patients with pneumonia during the 12 months before the onset date of the index case to identify cases that may have been healthcare-associated.
    - Were patients with pneumonia that may have been healthcare-associated tested for *Legionella?*
- Review facility laboratory records to identify any positive *Legionella* test results in the past 12 months.

CDC's Healthcare Line List Template and Legionnaires' Disease Medical Record Abstraction Form Template may be useful for summarizing information during the retrospective chart review.

Active clinical surveillance should be conducted for 2–6 months after a full investigation is initiated to proactively identify patients with healthcare-associated pneumonia and test these patients for *Legionella*. To identify patients with healthcare-associated pneumonia, consider reviewing:

[1] defined as clinical diagnosis of pneumonia or radiographic evidence of pneumonia with onset at least 48 hours after admission.

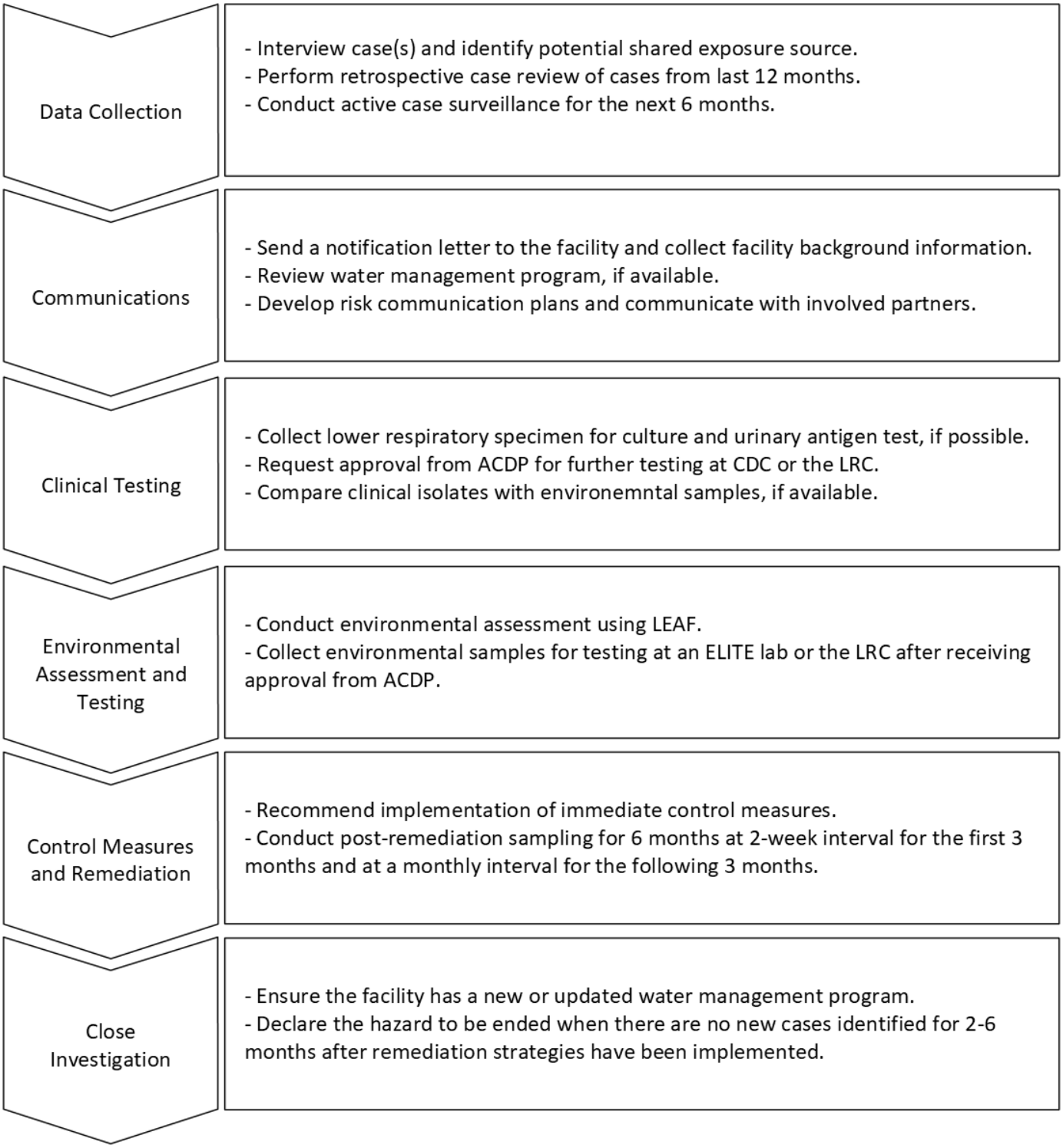
- Chest radiographs and CT scans ordered to diagnose pneumonia
- New pneumonia diagnoses in patients in the ICU
- Laboratory testing ordered to diagnose pneumonia

Any clinical specimens collected from patients as part of active clinical surveillance should be kept until the investigation has ended.

For more information, review CDC's *Looking for Additional Healthcare-associated Cases*.

APPENDIX

Appendix A: Investigation Flowchart



Appendix B: One-Page Checklist for LPHAs to Conduct Full Investigations

The checklist for steps in a full investigation is below. Consider conducting a full investigation when:

- 1 presumptive healthcare-associated case has been identified; or
- 2 possible healthcare-associated cases have been identified within a 12-month period; or
- 2 travel-associated cases with a shared exposure to a hotel or other accommodation have been identified within a 12-month period; or
- Higher-than-expected community-associated case counts have been observed within a defined geographic area within a 12-month period.

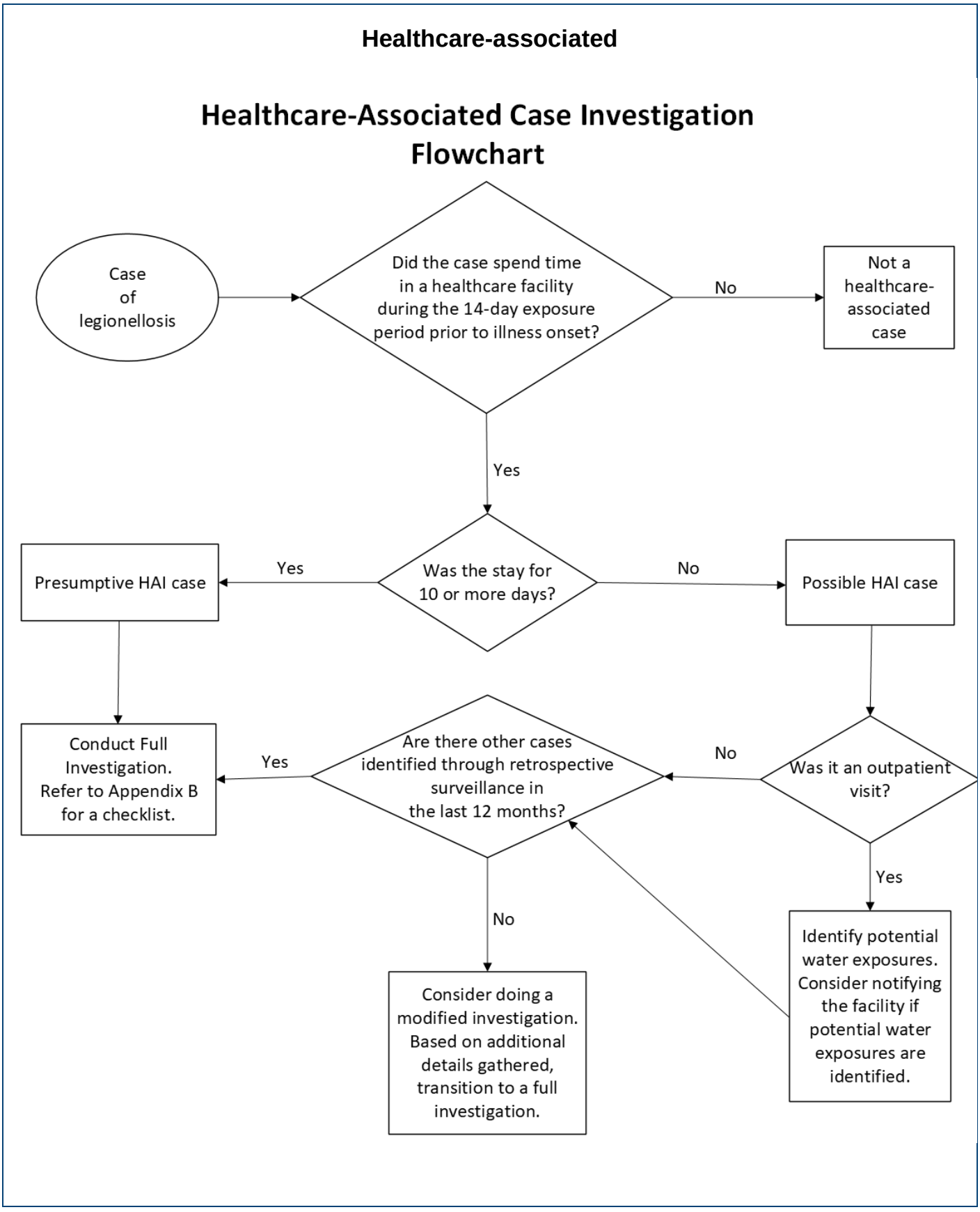
- ☐ Case Identification
  - ☐ Interview case to identify potential exposure source.
  - ☐ Conduct retrospective review of cases with similar exposures in the last 12 months.
  - ☐ Conduct active case surveillance to identify new cases.
- ☐ Test clinical specimens
  - ☐ Attempt to collect lower respiratory specimen for culture and urinary antigen test.
  - ☐ Request approval from ACDP and OSPHL for further testing with CDC/LRC.
  - ☐ Compare clinical isolate with environmental samples, if available.

<u>If plausible common exposures are identified:</u>

- ☐ Facility notification
  - ☐ Send a notification letter to the facility.
  - ☐ Gather facility background information.
  - ☐ Review water management program.
  - ☐ Recommend implementation of immediate control measures.
- ☐ Environmental assessment and sampling
  - ☐ Recommend that facility work with a consultant with expertise.
  - ☐ Use LEAF form and marking guide.
  - ☐ Collect environmental samples.
  - ☐ Coordinate testing of environmental samples with ACDP at an ELITE lab or request approval from ACDP for further testing with LRC.
- ☐ Communications
  - ☐ Develop risk communications plan.
  - ☐ Communicate with all involved partners.
- ☐ Implement remediation strategies based on environmental sampling results
  - ☐ Conduct post-remediation sampling.
- ☐ Close investigation
  - ☐ Ensure facility has a new or updated water management plan.
  - ☐ Declare the hazard to be ended.

Appendix C: Setting-Specific Criteria to Conduct Investigations

Healthcare-associated



Community-associated

Consider conducting a full investigation if there is an increase in cases observed in a defined geographic area (case counts are higher than expected).

Consider conducting an environmental assessment if there is not enough evidence for sampling by identifying common sources of exposure (cooling towers, fountains, hot tubs, misting devices, pools, etc.) or recent activities (construction, changes in potable water disinfection, water main breaks or service interruptions).

Travel-associated

Conduct a full investigation if two or more cases are identified who stayed overnight at the same accommodation during their exposure period (14 days before symptom onset) and had symptom onsets within 12 months of each other.

Consider doing a full investigation if cases are farther apart in time, there was a previous outbreak, or cases did not stay overnight at an accommodation.

Congregate living (correctional facility, assisted living, group homes)

Considerations for conducting a full investigation in congregate living settings are the same as those for healthcare settings (see healthcare-associated considerations above).

Conduct a full investigation if there is a single case identified at a correctional facility or other setting where people are unable to leave the premises. Even if a full investigation is not warranted, consider conducting environmental assessment and review of the building's Water Management Program (WMP).

Appendix D: Master List of Resources

Resource	Purpose
General Investigation	
Oregon *Legionella* Investigative Guidelines	Oregon Health Authority's investigative guidelines to guide case investigations.
CDC: Extended Case Report Form for Legionellosis	Supplemental case report form that can be used to gather additional information on exposures and comorbidities, as well as for hypothesis generation.
Public Drinking Water Systems	
Oregon Drinking Water Advisories	Online data on water system violations, enforcements, public notices and water advisories, and basic system information.
Oregon Drinking Water Data Online	Online data on public drinking water systems in Oregon; includes information on water system contacts and regulators.
Environmental Assessment & Sampling	
CDC: *Legionella* Environmental Assessment Form (LEAF) Marking Guide CDC: *Legionella* Environmental Assessment Form (LEAF)	The guide provides instructions and additional considerations when completing the environmental assessment form.
CDC: Sampling Procedure and Potential Sampling Sites	Protocol for how to properly collect environmental samples (standard biofilm swab, bulk water, filter samples), from commonly sampled sites, such as potable water, whirlpool spas, cooling towers, and other sources.
How to Make a Sampling Plan (video)	How to determine the number of samples needed and where to collect them.

How to Sample Potable Water (video)	How to properly collect samples of potable water.
CDC: Strategies for Identifying Cooling Towers	Tips to identify cooling towers.
Characteristics of Cooling Towers	How to identify locations of all cooling towers in the area. Strategies can include using GIS, aerial photography, physical assessment, street view imagery, or by checking with building owners and managers. Define the search zone using epidemiologic data (collect patient location history for 14 days prior to illness onset).
How to Sample Cooling Towers (video)	How to properly collect samples from cooling towers.
How to Sample Spas and Fountains (video)	How to properly collect samples from spas, hot tubs and fountains.
Clinical & Environmental Testing	
ELITE Laboratories	A list of laboratories that are part of the Environmental *Legionella* Isolation Techniques Evaluation (ELITE) Program.
TNI-Accredited Laboratories	Search for laboratories that are accredited by the NELAC Institute (TNI) for environmental testing.
Legionella Reference Center (LRC)	The LRC performs *Legionella* testing for clinical and environmental case and outbreak samples submitted by governmental public health and environmental laboratories.
CDC: Submitting Specimens for *Legionella* Testing Clinical Specimens or Isolates Environmental Samples and Isolates	Specimen, documentation, packaging, and shipping requirements for clinical and environmental specimens.

Water Management Program	
CDC Toolkit: Developing a *Legionella* Water Management Program	Toolkit intended for building owners and managers to develop their own WMP.
CSTE Water Management Program Template	Template to develop a WMP.
CSTE: Water Management Program (WMP) Evaluation Tool	Toolkit to help determine if a facility's WMP adheres to the key elements of ASHRAE Standard 188 and CDC's WMP Toolkit.
CSTE: Recommendations for Review of Water Management Programs to Reduce Risk of *Legionella* in Healthcare and Community Facilities	A supplement to the evaluation tool and includes best practices for reviewing WMPs.
CDC: Public Health Strategies for *Legionella* Control	Guidance for preventing *Legionella* growth in building water systems and devices.
CDC: Monitoring Building Water	Guidance for monitoring the temperature, disinfectant residuals, and pH of building water, as well as areas with stagnant water to prevent *Legionella* growth within a building's water system.
CDC: Routine testing for *Legionella* Control	Guidance on routine environmental testing for *Legionella* when there is not an outbreak.
Communication	
CSTE: Legionnaires' Disease Risk Communication Toolkit	A comprehensive >200 page toolkit intended to help state, tribal, local, and territorial health agencies to communicate with key audiences. It has setting-specific modules for the following: • Healthcare facilities • Congregate residential facilities • Hotels and hospitality facilities • Community settings • Routine environmental testing results in the absence of cases

CSTE: Legionnaires' Disease Risk Communication Toolkit Appendix	A >150-page document that includes templates, sample letters to facilities, public health orders, health department advisories, and press releases. Refer to page A9 of the appendix for a complete list of available templates and samples.
Preventing *Legionella* at Home	
New York Department of Health: Prevent Legionnaires' Disease at Home	Tips for reducing *Legionella* risk in the home for people at higher risk of Legionnaires' disease.
CDC: About Choosing Home Water Filters	Tips on selecting home water filters to improve taste and safety of water.
CDC: Well Water Safety	Resource for maintaining private wells.
CDC: Vacation Rental Owners and Managers	Considerations for preventing *Legionella* in vacation and rental properties.
Control Measures & Remediation Methods	
HICPAC Guidance	Recommendations of CDC and Healthcare Infection Control Practices Advisory Committee (HICPAC) for preventing healthcare-associated pneumonia.
CDC: Toolkit for Controlling *Legionella* in Common Sources of Exposure • Potable water systems • Cooling towers • Fountains • Hot tubs • Other devices • Healthcare facilities	Toolkit that provides control measures and remediation methods for commonly implicated sources.
American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE): Guidance for Water System Risk Management • ANSI/ASHRAE Standard 514, Risk Management for Building Water	Guidance on the prevention and control of *Legionella* in building water systems.

Systems: Physical, Chemical, and Microbial Hazards • ANSI/ ASHRAE Standard 188, Legionellosis: Risk Management for Building Water Systems • ASHRAE Guideline 12, Managing the Risk of Legionellosis Associated with Building Water Systems	
Healthcare-Associated Investigations	
CDC: Looking for Additional Healthcare-Associated Cases	Detailed guidance on conducting surveillance for additional healthcare-associated cases.
CDC: Healthcare Line List Template	Optional line list template that can be used to collect information associated with healthcare exposures.
CDC: Legionnaires' Disease Medical Record Abstraction Form Template	Optional form that can be customized to collect clinical and epidemiologic data about suspected cases.
Travel-Associated Investigations	
CDC: Travel Line List Template	Optional line list template that can be used to collect information associated with travel exposures.
CDC: Cruise Ship Questionnaire Template	Optional line list template that can be used to collect information associated with cruise-ship exposures.
Community-Associated Investigations	
CDC: Community Line List Template	Optional line list template that can be used to collect information associated with community exposures.

Appendix E: Preventing *Legionella* at Homes

Prevent the growth of *Legionella* in household water systems. Source: New York State Department of Health: Prevent Legionnaires' Disease at Home.

- Let water run for a few minutes if it's not been used for more than three days; if the water system was turned off for plumbing work; or if a "boil water" notice was issued.
- Avoid leaving garden hoses lying in the sun, since warm, stagnant water promotes growth.
- Routinely replace water filters, as recommended by manufacturer's instructions, in appliances such as refrigerator water dispensers and ice makers.
- Routinely check chlorine levels in pools and hot tubs, and ensure that appropriate levels are maintained.
- Consider raising the water heater to above 120°F to minimize *Legionella* growth. Be mindful that temperatures of ≥130°F can increase risk of hot-water burns; therefore, take extra precautions to mix cold and hot water at the faucet and shower.
- Flush hot-water heater twice a year per manufacturer's instructions.
- Consider using a water softener to stop buildup of scale in water pipes.

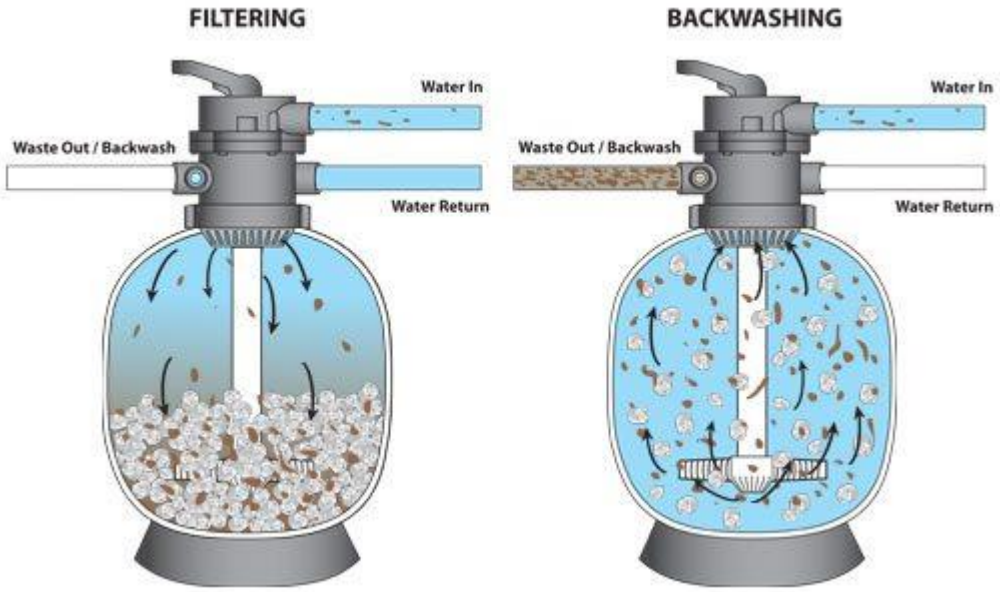
Appendix F: Sand filter back wash for pools and spas

Environmental Assessment for *Legionella* when investigating a sand filter at pool or spa.

Sand filters are frequently used for pools and spas. They are easy to use and can be backwashed quickly. To backwash a sand filter, the water is pumped from the pool into the bottom of the sand filter. The backwash water then agitates the sand to loosen and flush the debris into the sewer. In order to get a 'good scrub' on the sand, the backwash water should be supplied at 15 gallons per minute (gpm) per square foot of the sand filter. This is an industry (general) standard. Problems are often found when multiple sand filters are used on the same vessel (pool). There may be only one pump that is backwashing multiple sand filters at the same time. In this situation, the single pump may not be able to provide the required 15 gpm/sq ft to clean both sand filters at the same time. One way to solve this problem is to add a valve to the plumbing that would allow the pump to backwash one sand filter at a time.

Recommend collecting the following data during a field investigation:

1. Size of the sand filter(s): this information is listed on the shell of the filter (e.g., 7.06 ft^2).
2. Gallons per minute going through the filter system when the filter(s) are backwashed. This can be read from the flow meter located on the pool piping (e.g., 90 gpm).
3. 90 gpm divided by 7.06 ft^2 equals a backwash rate of 12.75 gpm/ft^2. For this example, the backwash rate does not meet the recommended minimum of 15 gpm/ft^2.



Appendix G*: Legionella* Investigation Facility Background Questionnaire

Purpose: The purpose of this questionnaire is to provide the Acute & Communicable Disease Prevention Section (ACDP), local public health authorities (LPHAs), and local environmental health (EH) with a better understanding of a facility's water systems and devices. The responses to this questionnaire are used to guide which immediate control measures may be recommended to reduce the risk of *Legionella* exposure of people in or around the facility. Please complete the questionnaire to the best of your ability and send your responses to ACDP, LPHA Communicable Disease (CD), and local EH staff supporting the investigation. If you are unsure how to respond to a question, it is okay to leave that question blank for now or ask ACDP, LPHA CD, and local EH staff for clarification.

Acknowledgments: This questionnaire is a modified version of the *Legionella Outbreak Investigation Facility Background Request Form* developed by the New Jersey Department of Health. Several questions are also borrowed from CDC's *Legionella* Environmental Assessment Form (LEAF).

Part 1. Facility Contact Information

a. Date Questionnaire Completed:	
b. Facility Name:	
c. Facility Address:	
d. Facility Contacts (Name, Title, Phone, Email):	
Facility Point of Contact:	
Facility Owner:	
Facility Manager/Administrator:	
Facility Maintenance Director:	
Facility Infection Preventionist or Infection Control Specialist:	
Additional Facility Point of Contacts (include *Legionella* consultant if applicable):	

Part 2. Facility Characteristics

a. Type of Facility (select all that apply):	☐ Healthcare facility ☐ Acute care/hospital ☐ Outpatient clinic ☐ Ambulatory surgical center ☐ Dialysis center ☐ Dental clinic ☐ Nursing Home/long-term care/assisted living facility ☐ Other healthcare setting, please specify: _____ ☐ Residential facility ☐ Retirement/independent living facility ☐ Group home ☐ Apartment or condominium complex ☐ Private residence ☐ Other residential setting, please specify: _____ ☐ Prison or jail ☐ Travel Accommodation ☐ Hotel, motel, or resort ☐ Ship ☐ Vacation rental property ☐ Other travel accommodation, please specify: _____ ☐ Recreational facility ☐ Gym, fitness center, health club ☐ Spa ☐ Pool ☐ Water park ☐ Other recreational facility, please specify: _____ ☐ Workplace

	☐ Industrial/manufacturing facility ☐ Office building ☐ Other work setting, please specify: _____ ☐ School or daycare ☐ Food service ☐ Grocery store or market ☐ Restaurant ☐ Other facility type, please specify: _____
b. Does the facility have a Water Management Program (WMP)?	☐ Yes ☐ No ☐ Unknown
c. If the facility has a WMP, is the facility be willing to share a copy of the WMP with ACDP, LPHA CD, and local EH?	☐ Yes ☐ No ☐ Unknown
d. Who oversees the facility's WMP? (Please list names and roles).	
e. Does the facility maintain operational and maintenance records related to the WMP?	☐ Yes ☐ No ☐ Unknown
f. Does the facility routinely collect environmental samples for *Legionella* testing?	☐ Yes, please specify the most recent environmental sample collection date: M M / D D / Y Y Y Y ☐ No ☐ Unknown
g. Has *Legionella* been detected in environmental samples collected from potable hot or cold-water distribution systems or devices in the past 12 months? Examples of devices may include: cooling towers, hot tubs, pools, or fountains.	☐ Yes, please describe: _____ ☐ No ☐ Unknown
h. Has there been any recent or ongoing major construction on or	☐ Yes, please describe: _____

around the facility in the past 12 months?	☐ No ☐ Unknown
i. Have there been any major events that affected the facility's water systems in the past 12 months (either in the public water system before water enters the facility or on the facility property)? Examples may include pressure drops, boil-water advisories, or water disruptions (e.g., water-main break).	☐ Yes, please describe: _____ ☐ No ☐ Unknown

Part 3. Building Information and Building Water Systems

Please complete one copy of Part 3 for each building that will be included in the environmental assessment based on the case(s)'s exposure history. Areas that should be included in the environmental assessment include any water-distribution systems and water devices that the case(s) were exposed to during the 14 days before onset of legionellosis symptoms.

Part 3a. Building Information	
a. Total number of buildings on the facility premises:	
b. Total number of buildings that will be included in the environmental assessment:	
c. Name of building:	
b. Purpose and services provided on each floor or area of the building:	
c. Does the building have a basement or subgrade levels?	☐ Yes ☐ No ☐ Unknown
d. Number of stories or levels in the building (including basement or subgrade levels):	
e. Does the building have any commercial spaces?	☐ Yes, please list number and name of commercial spaces: _____ ☐ No ☐ Unknown

f. Number of rooms that can be occupied overnight:	
g. Number of private bathrooms with showers or bathtubs:	
h. Number of private bathrooms without showers or bathtubs:	
i. Number of common bathrooms with showers or bathtubs:	
j. Number of shower or bathtub fixtures per common bathroom:	
k. Number of common bathrooms without showers or bathtubs:	
Part 3b. Building Water Systems	
l. Source of cold-water supply:	☐ Public water system ☐ Private well ☐ Other, please specify: _____
m. Does the building share the cold-water system with any other building?	☐ Yes, please specify: _____ ☐ No ☐ Unknown
n. How many separate hot-water systems or zones does the building have?	
o. Describe each hot-water system:	
p. Is the water tempered (i.e., maintained at a temperature of 85°F–110°F or 29°C–43°C)?	
q. Is the water recirculated?	
r. What areas are served by this hot-water system? Include the floors and number of rooms.	
s. Does the building share the hot-water system(s) with any other building?	☐ Yes, please specify: _____ ☐ No

	☐ Unknown
t. Is there a supplemental disinfection system installed on the potable water?	☐ Yes, please specify: _____ ☐ No ☐ Unknown
u. For each supplemental disinfection system, indicate the date installed, type of system, and area served:	

Part 4. Water Devices

a. Does the facility have a cooling-tower system(s)?	☐ Yes ☐ No ☐ Unknown
b. How many separate cooling-tower systems does the facility maintain and operate?	☐ 1 ☐ 2 or more ☐ Unknown
c. Is a chemical or biocide treatment used on the cooling-tower system(s)?	☐ Yes ☐ No ☐ Unknown
d. Type of cooling-tower system treatment used (please select all that apply):	☐ Oxidizing biocide ☐ Non-oxidizing biocide ☐ Scale and corrosion control inhibitors ☐ Other, please specify: _____
e. Does the facility have any pools, spas, hot tubs, saunas, steam rooms, or other recreational bathing establishments?	☐ Yes, please specify: _____ ☐ No ☐ Unknown
f. Does the facility have any fountains or water features (indoor or outdoor)?	☐ Yes, please specify: _____ ☐ No ☐ Unknown

g. Does the facility have any of the following dental or medical devices? (Select all that apply)	☐ Bronchoscopes ☐ CPAPs ☐ Heater-cooler units ☐ Scalers ☐ Other dental or medical equipment that uses potable water, please specify: _____
h. Does the facility have any of the following equipment? (Select all that apply)	☐ Evaporative coolers ☐ Expansion tanks ☐ Humidifiers ☐ Ice machines ☐ Produce and recreational misters ☐ Safety showers and eyewash stations ☐ Spray and pressure washing ☐ Other equipment that uses potable water, please specify: _____
i. Does the facility have any of the following systems? (Select all that apply)	☐ Fire suppression systems ☐ Lawn sprinklers and irrigation systems ☐ Solar water-heating systems ☐ Machine/metal-working lubrication and coolant systems ☐ Water-jet cutters and other machining devices that use water ☐ Water-storage systems for high-demand or emergency use ☐ Secondary water collection, storage, and use systems ☐ Other, please specify: _____

Appendix H: Respiratory Therapy Equipment

When respiratory therapy equipment, (e.g., CPAP, bronchoscope, in-line or hand-held nebulizer, etc.) is identified as a potential source of exposure to *Legionella,* consider humidification sources. The following principles can be helpful when assessing respiratory water practices:

- Review water sources used for all respiratory therapy devices. These should include CPAP and BiPap machines, bronchoscopes, in-line and hand-held nebulizers, and ventilator circuits, among others.
- Identify if tap water is ever used in respiratory therapy devices. Only sterile or distilled water should be used for respiratory care.
- Review the process to ensure respiratory therapy equipment is being cleaned and disinfected before next patient use per the manufacturer instructions. Recommend that equipment be tagged and dated after being disinfected and before being stored. Ensure respiratory therapy equipment is tracked and monitored. Assign staff responsible for cleaning respiratory therapy equipment and ensure training is up to date for those responsible.
- Hand-held nebulizers, when used, should be rinsed with sterile water and allowed to air dry between uses. Where sterile water is not available, nebulizers should be rinsed with isopropyl alcohol and forced-air dried or dried in a drying cabinet.
- Review the humidification units used. If multi-use humidifier units are in use, review the process for cleaning, disinfection, sterilization, and storage to ensure practices adhere to manufacturer instructions for use.
- Assess bronchoscope exposure. Where bronchoscope exposure is a suspected mode for transmission, review bronchoscopy processing practices to ensure adequate high-level disinfection, drying, storage, and handling.

You can get this document in other languages, large print, braille or a format you prefer free of charge. Contact the Acute and Communicable Disease Prevention section at OHD.ACDP@odhsoha.oregon.gov or 971-673-1111. We accept all relay calls.

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