

Introduction

Purpose

The *Legionella* Tabletop exercise aims to enhance public health preparedness and response by simulating a legionellosis investigation. This exercise will enable state and local public health staff to utilize the [Oregon Legionella Investigation Toolkit](#), assess current investigation protocols, and identify potential gaps in information and response strategies.

Legionellosis investigations are complex and time-intensive, requiring collaboration between state, tribal, and local public health authorities including communicable disease, infection prevention, environmental health specialists, facility managers, maintenance staff, and potentially *Legionella* consultants. Nationally and in Oregon, there is an increase in legionellosis clusters and outbreaks, and investigation falls on public health authorities.

In response, Oregon created a [Legionella Investigation Toolkit](#) as a reference guide for response across various settings, with special attention to healthcare facilities. This tabletop exercise will provide participants with hands-on experience using the [toolkit](#), better preparing staff to manage legionellosis investigations.

Background

Legionella bacteria are an emerging public health threat, disproportionately affecting vulnerable populations, including older adults, individuals with immunosuppression, smoking history, and underlying conditions such as chronic obstructive pulmonary disease (COPD) and diabetes. In Oregon, 71 cases of legionellosis were reported in 2024, with 96% requiring hospitalization and 6% resulting in death. While Oregon has historically had lower case rates than the U.S. overall, the incidence of legionellosis has increased in recent years.

Given this trend, it is critical to be prepared for legionellosis investigations. While existing resources from the Centers for Disease Control and Prevention (CDC) and other state public health authorities provide guidance, Oregon's [Legionella Investigation Toolkit](#) provides Oregon focused resources.

This tabletop exercise will introduce participants to the epidemiology of legionellosis, provide a guided tour of the new [toolkit](#), and facilitate discussion centered on a scenario-based exercise.

Participants

This tabletop exercise is designed for individuals involved in legionellosis outbreak investigations, including disease surveillance, environmental health assessments, infection prevention, laboratory testing, and facility management. Each participant provides a unique perspective in ensuring an effective response to *Legionella*. Participants will work together to strengthen investigative workflows, improve coordination, and enhance confidence in responding to legionellosis cases.

Participants in this exercise could include (refer to 'Roles and Responsibilities' in the '[Oregon Legionella Investigation Toolkit](#)' for more details):

- **Local Public Health Authority (LPHA) Communicable Disease (CD) Staff:** Conduct case investigations, support environmental assessments, and coordinate with relevant partners.
- **Tribal Health Agencies:** Lead or collaborate on investigations as determined by the Tribe.
- **Local Environmental Health (EH) Staff:** Conduct environmental assessments, oversee sampling, and ensure control measures are implemented.

- **Acute and Communicable Disease Prevention (ACDP) Epidemiologists:** Support outbreak investigations, review facility Water Management Programs (WMP), and coordinate sample testing.
- **Facility Staff (Healthcare, Long-Term Care, High-Risk Facilities):** Maintain Water Management Programs (WMP), collaborate on environmental sampling, and implement remediation measures.
- **Laboratory Personnel (Private, Oregon State Public Health Laboratory (OSPHL), CDC, Environmental *Legionella* Isolation Techniques Evaluation (ELITE), and *Legionella* Reference Center (LRC)):** Conduct clinical and environmental testing, including antigen tests, PCR, culture, and molecular characterization.
- **Environmental Consultants:** Provide environmental assessments, recommend remediation measures, and support water management program development.
- **Oregon Drinking Water Services (DWS):** Provide information on drinking water system events that may impact water quality, such as treatment interruptions, disruptions and maintenance.

Exercise Objectives

At the conclusion of this tabletop exercise, participants will be able to:

- Effectively utilize the [Oregon Legionella Investigation Toolkit](#) to guide their decision-making.
- Collaborate more efficiently with state and local communicable disease and environmental health teams, facility management, and/or consultants to ensure a coordinated response.
- Apply best practices, including active case finding, environmental sampling, risk assessment, and source determination.
- Identify gaps in investigation protocols and recommend improvements to enhance the clarity of the [toolkit](#).
- Navigate the complexities of legionellosis response.

Exercise Structure

This tabletop exercise is designed to be an interactive, facilitated discussion in which participants engage in a structure scenario-based investigation of a legionellosis outbreak. The exercise will encourage collaboration, critical thinking, and the application of the [Oregon Legionella Investigation Toolkit](#) to strengthen response capabilities.

Participants will go through the following three modules, each focusing on a different phase of the investigation:

Module 1: Case Identification and Initial Response

- Recognize and define cases by reviewing patient symptoms, risk factors and how cases were reported.
- Identify potential exposures by assessing shared locations, including water sources such as fountains and building water systems.
- Assess gaps in testing and surveillance to determine what clinical testing is needed.
- Determine the level of public health action, identify which agencies should be involved, and steps in notification.
- Determine the threshold for initiating an investigation.

Module 2: Environmental Assessment and Sampling

- Define the roles and responsibilities of environmental health, involved regulatory agencies, facility management, and other key partners.
- Understand the process and tools for conducting an environmental assessment, identifying potential sources, determining sampling strategies, and coordination of testing.

Module 3: Remediation and Monitoring

- Evaluate the effectiveness of control measures and remediation by conducting post-remediation environmental sampling and reviewing laboratory results.
- Conduct active case surveillance to determine whether there are new cases

- Establish criteria for closing an investigation or reopening an investigation.

The exercise will conclude with a group debrief, sharing insights, discussing best practices, and feedback/evaluation of the exercise through a survey QR code.

Exercise Guidelines

This tabletop exercise is designed to be a collaborative, low-stress learning opportunity. Participants are encouraged to actively engage in discussions, share experiences, and explore different response strategies.

Meeting expectations:

- The exercise is a safe, open discussion forum intended for learning, not for setting policies or precedents.
- All viewpoints are valued. Participants should listen to and respect differing perspectives.
- The scenario is realistic but *hypothetical* — meaning that no real names, cities, or counties were included. The focus is the investigation process.
- The facilitators will guide the discussion, participants should provide expertise based on their roles.
- Findings from the tabletop will help improve Oregon's investigation process.
- Findings from today's activities will and can be shared with colleagues.

This exercise is an opportunity to strengthen partnerships and improve public health preparedness across Oregon.

Roles and Responsibilities

Each role is important to ensure a productive and collaborative exercise:

Participants: Engage in discussions, share expertise, and apply real-world experience to the scenario.

Evaluator/Recorder: Observes the discussion, take notes on key points, and supports the group in summarizing during the debrief.

Facilitator: Guides the exercise and answers questions.

Group Leader: Leads the table discussions and keeps the conversations focused.

Reporting: Each group will rotate who reports out during the debrief for each module.

Module 1: Case Identification and Initial Response

Scenario Overview

It is April 25, 2025, and over the past two weeks, multiple cases of severe pneumonia have been reported in the region. Initially, these cases were treated as isolated incidents, but similarities in timing, patient demographics and possible exposure locations have raised concerns among public health officials and healthcare providers in City A.

At this point, no formal outbreak investigation has been launched, but hospitals and local public health authorities are concerned.

Nursing Home A Case One:

- Age: 78-year-old
- Sex: Male
- Residence: Nursing Home A

- Symptom onset: 7 days ago
- Symptoms: Fever, cough shortness of breath, confusion
- Medical History/Prior Illnesses: COPD, hypertension, former smoker

Three weeks ago, the patient was admitted to a Hospital A for a minor procedure unrelated to respiratory illness. He remained hospitalized for three days and was then discharged back to Nursing Home A. During his hospital stay, he had brief periods of mobility and spent time within and outside the hospital.

Five days ago, he developed worsening respiratory symptoms, prompting Nursing Home A to call emergency medical services. The patient was transported back to Hospital A, where he was admitted for severe pneumonia and placed in the intensive care unit due to respiratory distress.

During the patient's second hospitalization at Hospital A, laboratory testing included a respiratory PCR panel, which came back negative for all included pathogens. A *Legionella* urine antigen test (UAT) was also performed. This came back positive. No lower respiratory specimen was collected for culture. As per standard reporting protocols, the hospital's electronic health record system automatically generated an Electronic Case Report (eCR) and an Electronic Lab Report (ELR), which were transmitted to the Oregon Public Health Epidemiologists' User System (Orpheus) electronically for review by the LPHA CD staff.

At this point, the LPHA has received the case report and lab results and initiated a routine case interview. One notable detail is his previous hospitalization at Hospital A 11 days before symptom onset, raising questions about whether the exposure occurred at the hospital or within the nursing home.

Electronic Lab Report (ELR) and Electronic Case Report (eCR) from Nursing Home A Case

One: See Appendix A.

Appendix B. Timeline: See Appendix B.

Module 1 Discussion Questions

Question 1: What are some potential exposures to ask about during the case interview? Hint: Within the '[Oregon Legionella Investigation Toolkit](#)' look for case exposure assessment and environmental risk factors.

Question 2: What clinical diagnostic testing has been done and what additional tests need to be performed? Hint: Within the '[Oregon Legionella Investigation Toolkit](#)' look for 'Clinical Diagnostic Testing'. This section may provide recommendations for clinical testing.

Question 3: At this stage, should a full or modified investigation be initiated? If so, which agencies or organizations should be notified and involved in the response, and what will their roles be in the investigation? Hint: Within the '[Oregon Legionella Investigation Toolkit](#)' look for 'Opening and Closing an Outbreak', 'Setting-Specific Criteria to Conduct Investigations', 'Setting-Specific Considerations When Conducting Investigations', and 'Roles and Responsibilities'. These sections may provide guidance on when to launch an investigation and who should be involved.

Module 2: Environmental Assessment and Sampling

Additional Scenario Information

Although a formal outbreak declaration has not yet been made, a recent report from Hospital A of a fatal case of Legionnaires' disease and verbal reports of untested pneumonia cases from the infection preventionists (IP) at the nursing facility and at Hospital A have prompted public health officials to evaluate whether a full investigation and environmental sampling is warranted. Typically, City A reports 3-5 cases of legionellosis in a single year.

As part of this assessment, the LPHA requested a line list of pneumonia cases from Hospital A and Nursing Home A over the last 12 months to determine if there may be unrecognized cases for a medical record review. Reviewing these cases focused on patterns of illness, shared risk factors, or environmental conditions indicating a need for enhanced surveillance or targeted environmental testing.

The nursing home line list identified six residents diagnosed with pneumonia within the past year (including Nursing Home A Case 1). None of the other five residents diagnosed with pneumonia were tested for *Legionella*, and no clear clustering within the nursing home is noted. Additionally, Nursing Home A has a basic Water Management Program (WMP) template downloaded from a publicly available resource. A plumbing renovation occurred six months ago, but did not include environmental testing for *Legionella*. These renovations raise concerns about potential biofilm disruption and/or stagnant water accumulation.

The hospital line list identified three pneumonia cases, including the deceased patient who tested positive for *Legionella* via UAT. The other two pneumonia cases were not tested for *Legionella*, and no additional follow-up occurred. Hospital A routinely performs UAT testing for *Legionella* if healthcare-associated pneumonia is suspected (pneumonia with onset ≥ 48 hours after admission or when *Legionella* percent positivity of routine water samples, collected as part of the hospital's WMP, is elevated ($\geq 30\%$)).

Hospital A has a comprehensive WMP with routine maintenance, flushing schedules, water temperature, chlorine monitoring, and routine testing of the hospital water system for *Legionella* in alignment with recommended guidelines. Logs confirm consistent temperature monitoring and chlorine residuals. Percent positivity for *Legionella* from routine water samples has been $<10\%$ over the past 12 month-

period. Corrective actions are documented when thresholds are exceeded. Maintenance staff report that routine flushing schedules are followed, and there have been no known recent water disruptions. One notable finding is that an outdoor decorative fountain in the plaza next to the hospital is not included in the hospital's routine WMP, despite being on the hospital grounds and a prominent feature in a high-traffic area used by patients, visitors and staff.

Given these findings, public health and facility leadership decide to move forward with an environmental assessment and sampling to help identify potential sources and inform next steps.

Updated Timeline: See Appendix C.

Hospital A Line List: See Appendix D.

Nursing Home A Line List: See Appendix E.

Epi Curve: See Appendix F.

Outbreak Map: See Appendix G.

Module 2 Discussion Questions

Question 1: What additional resources should be requested at this stage of the investigation? Hint: Within the '[Oregon Legionella Investigation Toolkit](#)' look for 'General Considerations When Conducting Investigations' and 'Environmental Assessment and Sampling.'

Question 2: What are some potential exposures for these patients, and how would you prioritize which setting will need an environmental assessment? Who should be involved in the environmental assessment? Hint: Within the '[Oregon Legionella Investigation Toolkit](#)' look for 'Environmental Assessment and Sampling'. This section may provide recommendations for selecting environmental testing and determining sampling locations.

Question 3: What steps are necessary prior to, during, and after conducting an environmental assessment? Hint: Refer to the CDC's [Legionella Environmental Assessment Form \(LEAF\)](#).

Question 4: List items needed for environmental sampling. Where will environmental samples be tested, and how can the cases be linked to environmental sources? Who should be involved in decision making about

where to sample and who will be involved in collecting samples? Hint: Within the '[Oregon Legionella Investigation Toolkit](#)' look for the 'Roles and Responsibilities Table' and 'Environmental Sampling' within the toolkit.

Question 5: Who regulates the water sources and how can you find this out? Hint: Check the 'Water Utilities Program' section of the '[Oregon Legionella Investigation Toolkit](#)' for information on who regulates water sources and how to identify the appropriate regulatory authority for this investigation.

Question 6: Which agencies or organizations need to be notified, and what key information should be shared with them? Who requires immediate notification, and at what stage should CDC be informed? What resources or support can CDC provide in this situation? Hint: Check the 'Communication with the facility, people at risk, other agencies and the public' and 'Investigation Consultation' sections of the '[Oregon Legionella Investigation Toolkit](#).'

Question 7: Who will determine which immediate control measures to perform and how soon should these be completed? What immediate control measures should be considered? Hint: Refer to the 'Roles and Responsibilities Table' and 'Control Measures' section within the '[Oregon Legionella Investigation Toolkit](#).'

Module 3: Remediation and Monitoring

Conclusion to the Scenario

On May 7th, ACDP is notified of an out-of-state case of legionellosis with potential exposures in Oregon.

Idaho Case 1:

- Age: 65-year-old
- Sex: Female
- Residence: Idaho
- Symptom onset: 9 days ago
- Symptoms: Fever, chills, muscle aches, cough and shortness of breath
- Medical History/Prior Illnesses: hypertension and mild asthma but no known pre-existing lung conditions.
- Test results: UAT detected *Legionella pneumophila* serogroup 1

On April 17th, the patient traveled to Oregon to attend a professional conference. During her visit, she stayed for three nights at a hotel located near both Hospital A and Nursing Home A. During her visit, she frequently walked between her hotel, the convention center, and nearby amenities. A large decorative fountain located outside in the plaza near Hospital A, Nursing Home A, and the convention center, served as a popular gathering spot for visitors.

Throughout her stay, she spent time near the fountain while waiting for transportation and occasionally sat near it to have coffee in the mornings.

While not required, given the proximity of the conference center and hotel to the other sites involved in the investigation, the LPHA decided to contact the hotel and conference center to notify them of the investigation into a cluster of legionellosis cases with possible exposures in the area, including a case who spent time at the hotel and conference center. The LPHA requested copies of the hotel and conference center's WMPs and shared information with both facilities on where to find information about creating a WMP if they did not already have a WMP, including the [CDC Toolkit for Developing a Legionella Water Management Program](#).

After receiving the case report from Idaho, the LPHA and Idaho state health department coordinated with the ACDP epidemiologist to collect lower respiratory specimens for PCR and culture from Nursing Home A Case 1 and Idaho Case 1. Due to OSPHL not being able to perform testing for *Legionella*, ACDP requested that the specimens be submitted to the *Legionella* Reference Center (LRC) for confirmatory testing.

Updated Timeline: See Appendix H.

Clinical Results: See Appendix I.

Given the multiple shared locations and complexity of water systems in this area, ACDP consulted with the CDC *Legionella* team to discuss next steps and develop a sampling plan. The CDC *Legionella* team recommended using TowerScout, a specialized satellite mapping tool, to identify potential cooling towers in the vicinity.

Using this tool, the CDC *Legionella* team identified a ground-level cooling tower located on the rear side of the conference center, approximately 200 feet from the outdoor fountain in the plaza. This cooling

tower was not visible from public walkways and had not been included in the WMP provided by the conference center.

The cooling tower serves the HVAC system for the large spaces inside the conference center and is operated year-round. Routine *Legionella* testing is not performed.

Following this discovery, the environmental sampling plan was expanded to include the conference center cooling tower. Maintenance logs, water quality parameters, and biocide treatment schedule were requested, but were not available.

The LPHA and ACDP decided to test environmental samples at the LRC. Local EH collected the environmental samples and shipped the samples to the LRC.

L. pneumophila serogroup 1 was detected in the two clinical specimens and several of the environmental samples. LRC forwarded the positive clinical and environmental isolates to the CDC for *L. pneumophila* Sequence-Based Typing (SBT).

Environmental Sampling Results: See Appendix J.

SBT results showed that the *Legionella* detected in multiple samples from the outdoor fountain was a genetic match for the *Legionella* detected in the 2 clinical samples. The investigation team felt confident that the outdoor fountain was the likely shared exposure source. While the outdoor fountain is in a central plaza between buildings, the fountain is in hospital grounds and the responsibility of the hospital.

Local EH recommended the hospital remove the fountain. If they choose to keep the fountain, Hospital A should update their WMP to include control measures and monitoring of water parameters for the outdoor fountain, consider routine disinfection of the fountain, and conduct post-remediation testing of environmental samples.

Module 3 Discussion Questions

Question 1: When should post-remediation environmental samples be collected? How frequently should testing be conducted after remediation —weekly, monthly, or at longer intervals? How long should post-remediation environmental sampling continue? Hint: review ‘Post-Remediation Strategies and Environmental Sampling’ in the ‘[Oregon Legionella Investigation Toolkit](#).’

Question 2: What should be the criteria for declaring that the water system is safe to return to service after remediation? Hint: review ‘Post-Remediation Strategies and Environmental Sampling’ in the ‘[Oregon Legionella Investigation Toolkit](#).’

Question 3: How long should active case surveillance continue? Hint: review 'Cluster and outbreak surveillance' in the '[Oregon Legionella Investigation Toolkit](#).'

Question 4: What criteria need to be met to close this outbreak? Have these criteria been met? Hint: review 'Opening and closing an outbreak' in the '[Oregon Legionella Investigation Toolkit](#).'

Question 5: What updates should be made to Hospital A's WMP to support continued prevention and monitoring efforts? Hint: review 'Immediate Control Measures,' 'Remediation,' 'Post-Remediation Strategies and Environmental Sampling,' and 'Water Management Program' in the '[Oregon Legionella Investigation Toolkit](#).'

Question 6: What would be different if the investigation involved tribal agencies? When should tribal agencies become involved in a *Legionella* investigation? Hint: review 'Tribal Health Agencies' in the '[Oregon Legionella Investigation Toolkit](#).'

Evaluation and Closing

Wrap – Up and Review of Scenario

ACDP issued a HAN notifying healthcare providers to be aware of the potential for cases of legionellosis in the community and to consider ordering *Legionella* testing for any patients with suspected community-associated pneumonia, particularly if they report living, working or spending time in the vicinity of the conference center. The LPHA issued a press release to alert residents about the legionellosis cluster and the actions taken to prevent additional cases, using the alert and press release samples in the [CSTE Legionnaires' Disease Risk Communication Toolkit Appendix](#) as a guide. After six months with no new cases reported or new *Legionella* detections in the fountain, the outbreak was determined to be over, and the investigation was closed.

Evaluation

Thank you for your participation in this tabletop exercise! Your insights and engagement are invaluable in strengthening our response capabilities.

To help us improve future exercises, please take a moment to provide your feedback.



How to access the Feedback Form:

1. Scan the QR code below using your phone or tablet's camera.
2. Tap the link that appears to open the form.
3. Complete the short survey and submit your responses.

Your feedback helps us refine our approach and ensure future exercises are even more effective. We appreciate your time and input!

Appendix A. Electronic Lab Report (ELR) and Electronic Case Report (eCR) from Nursing Home Case One

<p>Specimen Date: 04/21/2025 Lag: 1 Day</p> <p>Specimen Type/Site: URINE SPECIMEN</p> <p>Order: Legionella Ag Ur QI</p> <p>Test: Legionella Ag Ur QI</p> <p style="text-align: center;">Positive (A)</p> <p>----- Other Details -----</p> <p>Patient Name: Case 1</p> <p>DOB: 12/25/1947 Sex: M Race: Unknown</p> <p>Address: 800 NE Oregon Street</p> <p>City A, OR 97232</p> <p>Phone: 971-673-1111</p> <p>Sending Facility: Hospital A</p> <p>Performing Lab: Hospital A Lab</p> <p>Ordering Facility: Hospital A</p> <p>123 A Street</p> <p>City A, OR 97232</p> <p>Phone: 971-673-1222</p> <p>Accession: #####</p> <p>Message ID: #####</p> <p>Report MRN: #####</p>	<p>It is OK to contact the patient regarding this report.</p> <p>-----</p> <p>Patient Name: Case 1</p> <p>DOB: 12/25/1947 Sex: M Race: Unknown</p> <p>Address: 800 NE Oregon Street</p> <p>City A, OR 97232</p> <p>Phone: 971-673-1111</p> <p>-----</p> <p>Legionellosis reported to OPHD on 04/22/2025 by Hospital A.</p> <p style="text-align: center;">Reporter: Dr. A [phone: 971-673-1222]</p> <p style="text-align: center;">Illness Onset: 04/18/2025</p> <p style="text-align: center;">Diagnosis is confirmed by lab results.</p> <p>-----</p> <p>Lab Info:</p> <p style="text-align: center;">Specimen collected: 04/21/2025 and sent to Hospital A Lab.</p> <p style="text-align: center;">Specimen Type: Urine Test Type: Antigen</p> <p style="text-align: center;">Patient may not be aware of these results.</p> <p>-----</p> <p>Reported to OPHD on 04/22/2025 9:00 AM by Hospital A Lab</p>
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Appendix B. Timeline

April 2025						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	2	3	4 Nursing Home A Case 1 Hospitalized at Hospital A for minor procedure	5
6	7 Nursing Home A Case 1 Discharged to Nursing Home A	8	9	10	11	12
13	14	15	16	17	18 Nursing Home A Case 1 Symptom onset	19
20 Nursing Home A Case 1 Worsening respiratory symptoms and admitted to Hospital A	21 Nursing Home A Case 1 Tests positive for <i>Legionella pneumophila</i> (UAT)	22 Nursing Home A Case 1 LPHA receives ECR and ELR from Hospital A	23	24	25	26
27	28	29	30			

Appendix C. Updated Timeline

April 2025						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1 Hospital A Case 3 tests positive for <i>Legionella</i> via UAT	2	3	4 Nursing Home A Case 1 Hospitalized at Hospital A for minor procedure	5
6	7 Nursing Home A Case 1 Discharged to Nursing Home A	8	9	10	11	12
13	14	15	16	17	18 Nursing Home A Case 1 Symptom onset	19
20 Nursing Home A Case 1 Admitted to Hospital A	21 Nursing Home A Case 1 Tests +for <i>Legionella</i>	22 Nursing Home A Case 1 LPHA receives ECR and ELR	23	24	25 Outbreak investigation start date	26
27	28 LPHA request line lists of pneumonia cases from Hospital A and Nursing Home A	29	30			
May 2025						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2 Hospital A shares line list and WMP	3
4	5 Nursing Home A shares line list and WMP	6	7	8	9	10

Appendix D. Hospital A Line List

Demographics & Symptoms

Name	Age	Sex	County	Underlying medical conditions	Onset Date	Symptoms	Outcome
Hospital A Case 1	63	M	County A	Former smoker, alcohol consumption (3+ drinks/day), COPD, diabetes	12/7/2024	Cough, shortness of breath, chest pain, malaise	Alive
Hospital A Case 2	78	F	County A	Diabetes, hypertension	1/27/2025	Fever, cough, shortness of breath, myalgia, malaise	Alive
Hospital A Case 3	81	F	County B	Former smoker, COPD, immunosuppressive therapy, lung cancer	3/29/2025	Fever, cough, shortness of breath, chest pain, myalgia, malaise, delirium	Deceased

Exposures

Name	Grocery Store	Whirlpool Spa	Swimming Pools	Recreational Mister	Decorative Fountain	Humidifier	Steam Room/Wet Sauna	Respiratory therapy equipment	Near Large Buildings	Large Building Location (s)
Hospital A Case 1	Y	Y	N	N	Y	N	N	Y	Y	Convention Center, Nursing Home, Hotel, Hospital
Hospital A Case 2	N	Y	N	N	Y	N	Y	Y	Y	
Hospital A Case 3	N	N	N	N	Y	Y	Y	Y	Y	

Note: For the exposures listed above, each “Y” or “N” indicates whether the case was associated with that specific location. In a real investigation, exact location, names, types of water used, water sources, and dates of exposure should be collected for any Y answers. For this tabletop exercise example, please refer to the Y/N indicators as placeholders for that detailed information.

Hospital location & Testing

Name	Room #	Units	ICU	Admit Date	Discharge Date	UAT	UAT Collection Date	UAT result	Culture
Hospital A Case 1	302	Cardiology	N	1/15/2025	12/27/2024	N		Not Done	N
Hospital A Case 2	118	General Med	N	3/5/2025	2/10/2025	N		Not Done	N
Hospital A Case 3	427	Oncology	Y	3/20/25	4/7/2025	Y	4/1/2025	Positive	N

Appendix E. Nursing Home A Line List

Demographics & Symptoms

Name	Age	Sex	County	Underlying medical conditions	Onset Date	Symptoms	Outcome
Nursing Home A Case 1	78	M	County A	COPD, hypertension, former smoker	4/18/2025	Fever, cough, shortness of breath, confusion	Alive
Nursing Home A Case 2	70	M	County A	Immunosuppressive therapy, lymphoma	3/2/2025	Cough, chest pain, shortness of breath	Alive
Nursing Home A Case 3	82	F	County A	Former smoker, COPD, diabetes, hypertension	2/24/2025	Cough, shortness of breath, headache, confusion	Alive
Nursing Home A Case 4	67	M	County A	Alcohol consumption (3+ drinks/day), diabetes, hypertension	2/18/2025	Fever, cough, shortness of breath, myalgia, headache	Alive
Nursing Home A Case 5	73	F	County A	Hypothyroidism, arthritis	1/30/2025	Cough, shortness of breath, malaise	Alive
Nursing Home A Case 6	85	F	County A	Former smoker, swallowing disorder, dementia	12/13/2024	Fever, cough, shortness of breath, chest pain, myalgia	Alive

Exposures

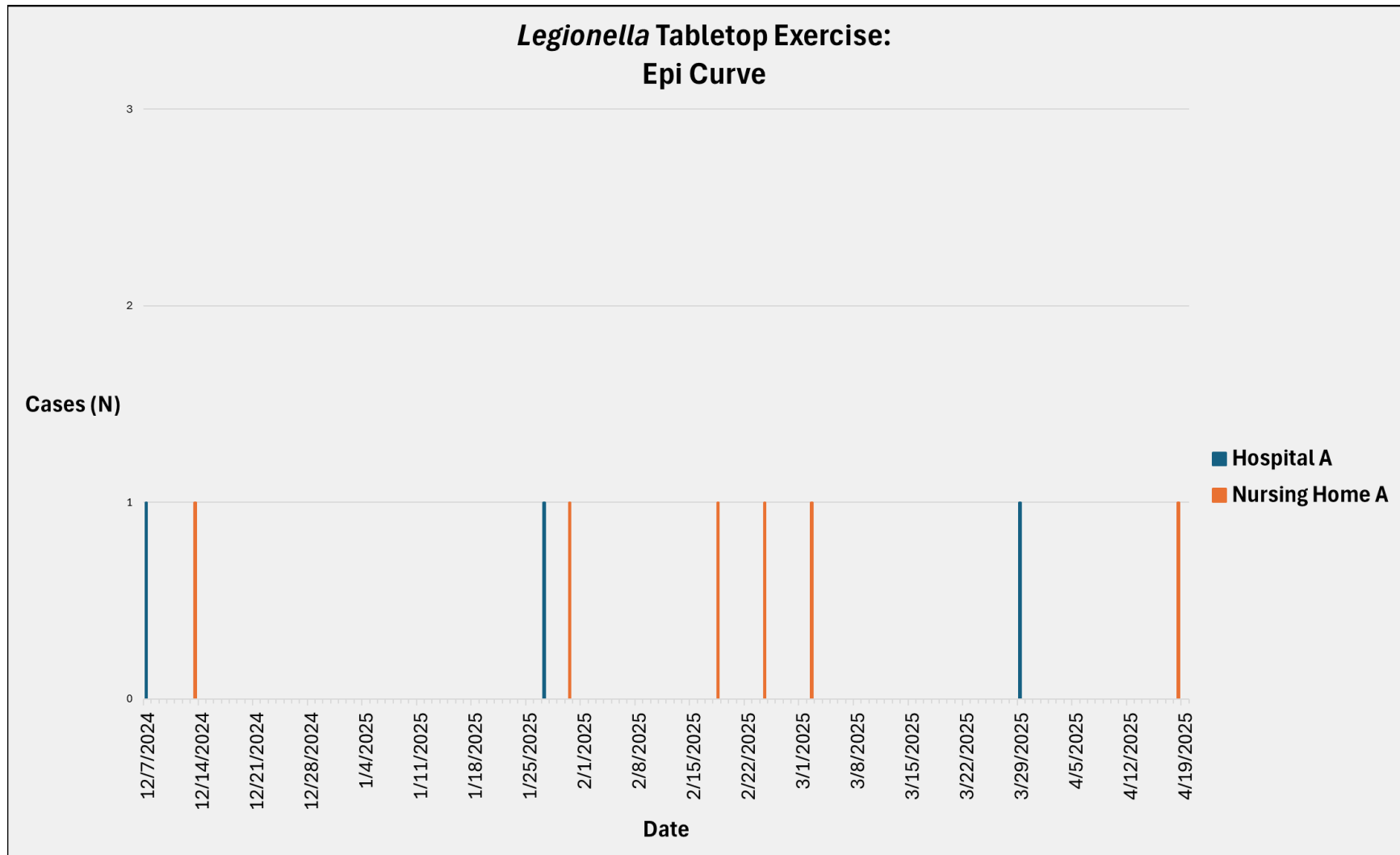
Name	Grocery Store	Whirlpool Spa	Swimming Pools	Recreational Mister	Decorative Fountain	Humidifier	Steam Room/Wet Sauna	Respiratory therapy equipment	Near Large Buildings	Large Building Location (s)
Nursing Home A Case 1	N	N	N	N	Y	Y	N	N	Y	Convention Center, Nursing Home, Hotel, Hospital
Nursing Home A Case 2	N	N	N	N	Y	N	N	N	Y	
Nursing Home A Case 3	N	N	N	N	Y	N	N	Y	Y	
Nursing Home A Case 4	Y	N	N	N	Y	N	N	N	Y	
Nursing Home A Case 5	N	Y	N	N	Y	N	N	N	Y	
Nursing Home A Case 6	N	N	N	N	Y	N	N	Y	Y	

Note: For the exposures listed above, each “Y” or “N” indicates whether the case was associated with that specific location. In a real investigation, exact location, names, types of water used, water sources, and dates of exposure should be collected for any Y answers. For this tabletop exercise example, please refer to the Y/N indicators as placeholders for that detailed information

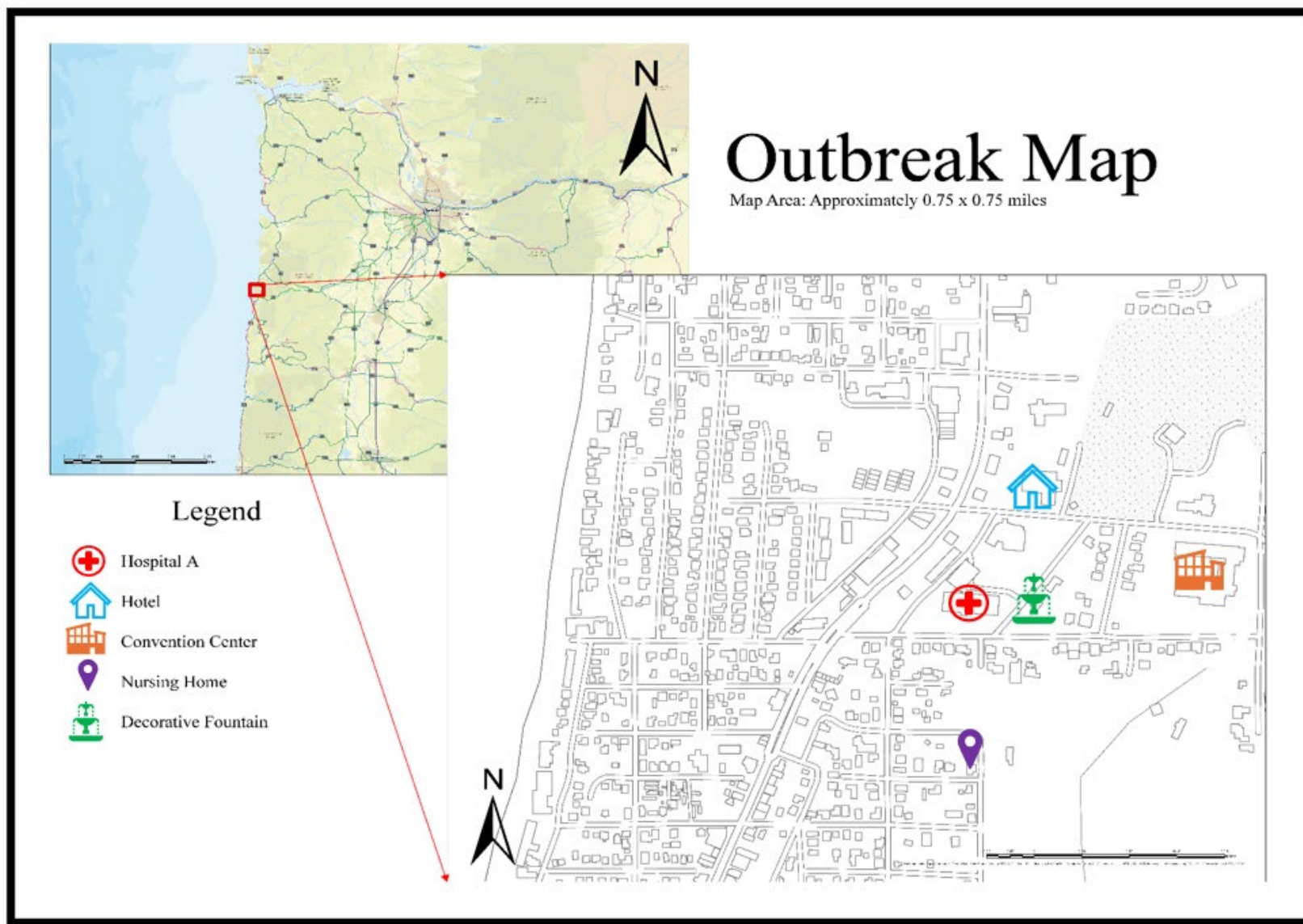
Nursing home location & Testing

Name	Room #	Units	UAT	UAT Collection Date	UAT result	Culture
Nursing Home A Case 1	214	Assisted Living	Y	4/21/2025	Positive	N
Nursing Home A Case 2	102	General Care	N		Not Done	N
Nursing Home A Case 3	315	Skilled Nursing	N		Not Done	N
Nursing Home A Case 4	127	General Care	N		Not Done	N
Nursing Home A Case 5	220	Assisted Living	N		Not Done	N
Nursing Home A Case 6	410	Memory Care	N		Not Done	N

Appendix F: Epidemiological Curve



Appendix G: Outbreak Map



Appendix H. Updated Timeline

April 2025						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1 Hospital A Case 3 tests + for <i>Legionella</i> via UAT	2	3	4 Nursing Home A Case 1 Hospitalized at Hospital A for minor procedure	5
6	7 Nursing Home A Case 1 Discharged to Nursing Home	8	9	10	11	12
13	14	15	16	17 Idaho Case 1 Travels to OR for conference at Convention Center	18 Nursing Home A Case 1 Symptom onset	19
20 Nursing Home A Case 1 Admitted to Hospital A Idaho Case 1 Leaves hotel and travels back to Idaho	21 Nursing Home A Case 1 Tests + for <i>Legionella</i>	22 Nursing Home A Case 1 LPHA receives ECR and ELR	23	24	25 Hospital A Case 3: LPHA notified of death & OB investigation start date	26
27	28 LPHA request line lists of pneumonia cases from Hospital A and Nursing Home A Idaho Case 1 Symptom onset	29	30			
May 2025						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1 Idaho Case 1 Symptoms worsen; admitted to Hospital B	2 Hospital A shares line list and WMP Idaho Case 1 Tests + for <i>Legionella</i> pneumophila serogroup 1 by UAT	3

4	5 Nursing Home A shares line list and WMP	6	7 Idaho Case 1 ACDP notified of case via Epi-X; ACDP notifies the LPHA	8 Nursing Home A Case 1 and Idaho Case 1 LPHA and Idaho State Health Department collect lower respiratory tract specimens from both patients and ship the specimens to the LRC	9 Idaho Case 1 LPHA notifies the hotel and conference center and request WMPs Nursing Home A Case 1 and Idaho Case 1 Specimens arrive at the LRC for testing	10
11	12 ACDP submits the APHL environmental test request form to the LRC	13	14 ACDP receives notification from the LRC that the environmental test request has been approved	15	16	17
18	19 Local EH collects the environmental samples and ships the samples to the LRC	20 The environmental samples arrive at the LRC for testing	21	22 Nursing Home A Case 1 and Idaho Case 1 Final clinical results are received from the LRC	23	24
June 2025						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4 Environmental results are received from the LRC	5	6	7
8	9	10	11	12	13	14
15	16	17	18 SBT results are received from the CDC	19	20	21

Appendix I. Clinical Results

Case ID	Date Collected	Location	Facility	Sample Type	<i>Legionella</i> Species based on MALDI-TOF	<i>Legionella</i> Species based on Multiplex PCR
OR1	5/18/25	Oregon	Hospital A/Nursing Home A	Sputum	<i>L. pneumophila</i>	<i>L. pneumophila</i> sg1
ID1	5/18/25	Idaho - OOS	Hospital B	BAL fluid	<i>L. pneumophila</i>	<i>L. pneumophila</i> sg1

Processing time at the LRC typically takes 14 days.

Appendix J. Environmental Sampling Results

Fountain

Sample ID	Date Collected	Sampling Location	Facility	Sample Type	Plate count	<i>Legionella</i> Species based on MALDI-TOF	<i>Legionella</i> Species based on Multiplex PCR
12345	5/19/25	Fountain	Plaza	Bulk water sample	300 CFU/mL	<i>L. pneumophila</i>	<i>L. pneumophila</i> sg1
12346	5/19/25	Fountain, water line	Plaza	Biofilm swab	250 CFU/mL	<i>L. pneumophila</i>	<i>L. pneumophila</i> sg1
12347	5/19/25	Fountain, inside jet	Plaza	Biofilm swab	200 CFU/mL	<i>L. pneumophila</i>	<i>L. pneumophila</i> sg1
12348	5/19/25	Fountain, nozzle	Plaza	Biofilm swab	200 CFU/mL	<i>L. pneumophila</i>	<i>L. pneumophila</i> sg1
12349	5/19/25	Fountain, internal light	Plaza	Biofilm swab	320 CFU/mL	<i>L. pneumophila</i>	<i>L. pneumophila</i> sg1
12350	5/19/25	Fountain, pump	Plaza	Biofilm swab	200 CFU/mL	<i>L. pneumophila</i>	<i>L. pneumophila</i> sg1

Public Utilities

Sample ID	Date Collected	Sampling Location	Facility	Sample Type	Plate count	<i>Legionella</i> Species based on MALDI-TOF	<i>Legionella</i> Species based on Multiplex PCR
12351	5/19/25	Water tower (supplies water to the area)	Public utility	Bulk water sample	<1 CFU/mL	Not performed	Not detected

Nursing Home A

Sample ID	Date Collected	Sampling Location	Facility	Sample Type	Plate count	<i>Legionella</i> Species based on MALDI-TOF	<i>Legionella</i> Species based on Multiplex PCR
12352	5/19/25	Incoming water main	Nursing Home A	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12353	5/19/25	Holding tank	Nursing Home A	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12354	5/19/25	Centralized water heater	Nursing Home A	Bulk water sample	<1 CFU/mL	Not performed	Not detected

12356	5/19/25	Expansion tank for hot water	Nursing Home A	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12357	5/19/25	Hot water returns	Nursing Home A	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12358	5/19/25	Cold water returns	Nursing Home A	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12359	5/19/25	Shower, Shared Bathroom, First Floor	Nursing Home A	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12360	5/19/25	Shower, Shared Bathroom, First Floor	Nursing Home A	Biofilm swab	<1 CFU/mL	Not performed	Not detected
12367	5/19/25	Faucet, Shared Bathroom, First Floor	Nursing Home A	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12368	5/19/25	Faucet, Shared Bathroom, First Floor	Nursing Home A	Biofilm swab	<1 CFU/mL	Not performed	Not detected
12399	5/19/25	Whirlpool Spa, Water in tub	Nursing Home A	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12400	5/19/25	Whirlpool spa, water line, sample 1	Nursing Home A	Biofilm swab	<1 CFU/mL	Not performed	Not detected
12401	5/19/25	Whirlpool spa, water line, sample 2	Nursing Home A	Biofilm swab	<1 CFU/mL	Not performed	Not detected
12402	5/19/25	Whirlpool spa, water jets, sample 1	Nursing Home A	Biofilm swab	<1 CFU/mL	Not performed	Not detected
12403	5/19/25	Whirlpool spa, water jets, sample 2	Nursing Home A	Biofilm swab	<1 CFU/mL	Not performed	Not detected
12404	5/19/25	Whirlpool spa, filter	Nursing Home A	Biofilm swab	<1 CFU/mL	Not performed	Not detected
12405	5/19/25	Whirlpool spa, compensation tank	Nursing Home A	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12406	5/19/25	Humidifier, Room 214	Nursing Home A	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12407	5/19/25	Humidifier, Room 214	Nursing Home A	Biofilm swab	<1 CFU/mL	Not performed	Not detected

Hospital A

Sample ID	Date Collected	Sampling Location	Facility	Sample Type	Plate count	<i>Legionella</i> Species based on MALDI-TOF	<i>Legionella</i> Species based on Multiplex PCR
12411	5/19/25	Incoming water main	Hospital A	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12412	5/19/25	Holding tank	Hospital A	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12413	5/19/25	Centralized water heater	Hospital A	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12414	5/19/25	Expansion tank for hot water	Hospital A	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12415	5/19/25	Hot water returns	Hospital A	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12416	5/19/25	Cold water returns	Hospital A	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12417	5/19/25	Sprinkler system, First Floor	Hospital A	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12418	5/19/25	Sprinkler system, Sprinkler jets, First Floor	Hospital A	Biofilm swab	<1 CFU/mL	Not performed	Not detected
12426	5/19/25	Safety Shower, First Floor	Hospital A	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12427	5/19/25	Safety Shower, Sprinkler jets, First Floor	Hospital A	Biofilm swab	<1 CFU/mL	Not performed	Not detected
12435	5/19/25	Eye wash station, First Floor	Hospital A	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12436	5/19/25	Eye wash station, Sprinkler jets, First Floor	Hospital A	Biofilm swab	<1 CFU/mL	Not performed	Not detected
12444	5/19/25	Faucet, Shared Bathroom, First Floor	Hospital A	Bulk water sample	<1 CFU/mL	Not performed	Not detected

12445	5/19/25	Faucet, Shared Bathroom, First Floor	Hospital A	Biofilm swab	<1 CFU/mL	Not performed	Not detected
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Conference Center

Sample ID	Date Collected	Sampling Location	Facility	Sample Type	Plate count	<i>Legionella</i> Species based on MALDI-TOF	<i>Legionella</i> Species based on Multiplex PCR
12450	5/19/25	Incoming water main	Conference Center	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12451	5/19/25	Cooling tower, make-up water	Conference Center	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12452	5/19/25	Cooling tower, collection basin	Conference Center	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12453	5/19/25	Cooling tower, collection basin	Conference Center	Biofilm swab	<1 CFU/mL	Not performed	Not detected
12454	5/19/25	Cooling tower, sump	Conference Center	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12455	5/19/25	Cooling tower, sump	Conference Center	Biofilm swab	<1 CFU/mL	Not performed	Not detected
12456	5/19/25	Cooling tower, storage tank/reservoir	Conference Center	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12457	5/19/25	Cooling tower, drift eliminators	Conference Center	Biofilm swab	<1 CFU/mL	Not performed	Not detected
12458	5/19/25	Cooling tower, heat sources	Conference Center	Bulk water sample	<1 CFU/mL	Not performed	Not detected

Hotel

Sample ID	Date Collected	Sampling Location	Facility	Sample Type	Plate count	<i>Legionella</i> Species based on MALDI-TOF	<i>Legionella</i> Species based on Multiplex PCR
12460	5/19/25	Incoming water main	Hotel	Bulk water sample	<1 CFU/mL	Not performed	Not detected

12461	5/19/25	Holding tank	Hotel	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12462	5/19/25	Centralized water heater	Hotel	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12463	5/19/25	Expansion tank for hot water	Hotel	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12464	5/19/25	Hot water returns	Hotel	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12465	5/19/25	Cold water returns	Hotel	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12466	5/19/25	Shower, Room 340, First Floor	Hotel	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12467	5/19/25	Shower, Room 340, First Floor	Hotel	Biofilm swab	<1 CFU/mL	Not performed	Not detected
12468	5/19/25	Faucet, Room 340, First Floor	Hotel	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12469	5/19/25	Faucet, Room 340, First Floor	Hotel	Biofilm swab	<1 CFU/mL	Not performed	Not detected
12470	5/19/25	Hot tub, Water in tub	Hotel	Bulk water sample	<1 CFU/mL	Not performed	Not detected
12471	5/19/25	Hot tub, water line, sample 1	Hotel	Biofilm swab	<1 CFU/mL	Not performed	Not detected
12472	5/19/25	Hot tub, water line, sample 2	Hotel	Biofilm swab	<1 CFU/mL	Not performed	Not detected
12473	5/19/25	Hot tub, water jets, sample 1	Hotel	Biofilm swab	<1 CFU/mL	Not performed	Not detected
12474	5/19/25	Hot tub, water jets, sample 2	Hotel	Biofilm swab	<1 CFU/mL	Not performed	Not detected
12475	5/19/25	Hot tub, filter	Hotel	Biofilm swab	<1 CFU/mL	Not performed	Not detected
12476	5/19/25	Hot tub, compensation tank	Hotel	Bulk water sample	<1 CFU/mL	Not performed	Not detected

Please note: in a real investigation, we would be collecting bulk water and biofilm swab samples from additional sites at each facility according to [CDC: Sampling Procedure and Potential Sampling Sites](#). For the purposes of this tabletop exercise, we are only showing selected results.

SBT Results

Case ID	Date Collected	Location	Facility	Sample Type	Allelic Profile	Sequence Type
OR1	5/19/25	Oregon	Hospital A/Nursing Home A	Sputum	2,19,5,10,18,1,10	ST222
ID1	5/19/25	Idaho - OOS	Hospital B	BAL fluid	2,19,5,10,18,1,10	ST222

Sample ID	Date Collected	Sampling Location	Facility	Sample Type	Allelic Profile	Sequence Type
12345	5/19/25	Fountain	Plaza	Bulk water sample	2,19,5,10,18,1,10	ST222
12346	5/19/25	Fountain, water line	Plaza	Biofilm swab	2,19,5,10,18,1,10	ST222
12347	5/19/25	Fountain, inside jet	Plaza	Biofilm swab	2,19,5,10,18,1,10	ST222
12348	5/19/25	Fountain, nozzle	Plaza	Biofilm swab	2,19,5,10,18,1,10	ST222
12349	5/19/25	Fountain, internal light	Plaza	Biofilm swab	2,19,5,10,18,1,10	ST222
12350	5/19/25	Fountain, pump	Plaza	Biofilm swab	2,19,5,10,18,1,10	ST222

Appendix K: Acronyms Used

Acronym	Definition
<i>ACDP</i>	Acute and Communicable Disease Prevention
<i>ALF</i>	Assisted Living Facility
<i>BAL</i>	Bronchoalveolar Lavage
<i>CD</i>	Communicable Disease
<i>CDC</i>	Centers for Disease Control and Prevention
<i>CFU</i>	Colony Forming Units
<i>COPD</i>	Chronic Obstructive Pulmonary Disease
<i>DWS</i>	Drinking Water Services
<i>ECR</i>	Electronic Case Report
<i>ECR</i>	Electronic Case Report
<i>EH</i>	Environmental Health
<i>ELITE</i>	Environmental <i>Legionella</i> Isolation Techniques Evaluation
<i>ELR</i>	Electronic Lab Report
<i>F</i>	Female
<i>HAN</i>	Health Alert Network
<i>HVAC</i>	Heating, Ventilation, and Air Conditioning
<i>ID</i>	Idaho
<i>IP</i>	Infection Preventionist
<i>LEAF</i>	<i>Legionella</i> Environmental Assessment Form
<i>LPHA</i>	Local Public Health Authority
<i>LRC</i>	<i>Legionella</i> Reference Center
<i>M</i>	Male
<i>MALDI-TOF</i>	Matrix-Assisted Laser Desorption Ionization – Time of Flight (mass spectrometry used for species ID)
<i>OOS</i>	Out of State
<i>OR</i>	Oregon
<i>ORPHEUS</i>	Oregon Public Health Epidemiologists' User System
<i>OSPHL</i>	Oregon State Public Health Laboratory
<i>PCR</i>	Polymerase Chain Reaction
<i>QA/QI</i>	Quality Assurance/Quality Improvement
<i>SBT</i>	Sequence Based Typing
<i>ST</i>	Sequence Type
<i>UAT</i>	Urine Antigen Test
<i>WMP</i>	Water Management Program
<i>Y/N</i>	Yes/No