Legionellosis Cluster/Outbreak Investigation:
Information for Businesses and Other Facilities

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Purpose of this document

The purpose of this document is to provide businesses (such as hotels) and other facilities with helpful information in the event of a cluster or outbreak of legionellosis that is linked to a certain business or facility. The following are covered in this document:

- General information about legionellosis.
- How to prevent legionellosis.
- What to expect when working with a public health agency on a legionellosis investigation.

Section 1 - General Information of Legionnaires' Disease

Legionellosis is a bacterial infection that can cause mild respiratory illness or pneumonia. It is associated with two distinct illnesses: Legionnaires’ disease and Pontiac Fever. Both Pontiac Fever and Legionnaires' disease may include influenza-like illness followed by high fever, chills, a cough, and sometimes muscle aches and headaches. Legionnaires' disease is the more severe illness, causing mild to severe pneumonia requiring prompt medical treatment. Pontiac Fever is a milder infection caused by the same type of Legionella bacteria. The symptoms of Pontiac Fever usually last for 2-5 days and include: fever, headaches, and muscle aches; however, there is no pneumonia. Symptoms will go away on their own without treatment and without causing further problems.

Legionella bacteria are widely distributed and found naturally in the environment, usually in water. The bacteria grow easily in water (77°F-108°F) systems, like the kind of water systems used for hot tubs, cooling towers, hot water tanks, large plumbing systems, or parts of the air-conditioning systems of large buildings. Cold water systems such as ice machines with filters have been documented to harbor Legionella bacteria and should not be overlooked as a possible source. Although Legionella bacteria do not survive drying, Legionella bacteria are commonly found in the soil, and it is possible that stirring up the soil (such as through excavation or gardening) may lead to cases of legionellosis infection.

People get Legionnaires' disease when they breathe in water mist or water vapors (small droplets of water in the air) that have been contaminated with the Legionella bacteria. Any water source that might be aerosolized (becoming airborne) should be considered a potential source for transmission of Legionella. The bacteria are rarely found in municipal water supplies and tend to colonize in plumbing systems and point-of-use devices (showerheads, faucets, etc.). The bacteria are not spread from one person to another person through person-to-person contact.

People most at risk of getting sick from Legionella bacteria include: older people (over age 50 years); people who smoke; those with a chronic lung disease; people with a weakened immune system from a disease like cancer, diabetes, or kidney failure; and people who take drugs to suppress the immune system (example: after a transplant operation or chemotherapy). Males are more commonly infected than females.
Legionella bacteria can cause serious infection in humans. Each year, it is estimated that between 8,000 and 18,000 people are hospitalized with Legionnaires’ disease in the U.S. More illness is usually found in the summer and early fall months, but it can happen any time of year.

Legionnaires’ disease symptoms can begin 2 to 10 days after being exposed to the bacteria, but symptoms most often occur 5 to 6 days after exposure. Symptoms are similar to many other forms of pneumonia, making it difficult to diagnose at first. Signs of Legionnaires’ disease include: a high fever, chills, a cough, muscle aches, and sometimes diarrhea, mental confusion, and headaches. Chest X-rays are needed to find the pneumonia caused by the bacteria, and other tests can be done on sputum (phlegm), as well as urine to find evidence of the bacteria.

### Section 2 - Legionellosis Prevention

Water sources that commonly grow Legionella bacteria include: cooling towers, evaporative condensers, fluid coolers that use evaporation to reject heat, hot water systems that operate below 140 degrees Fahrenheit, humidifiers, decorative fountains, spas and whirlpools.

The ecology of Legionella in water systems is not fully understood. However, certain conditions have been found to affect its growth rate. These conditions include:

- Sediment, sludge, scale and organic materials can harbor the bacterium and promote growth.
- Water temperatures between 68°F (20°C) to 113°F (45°C) favor growth.
- Water systems that have stagnant areas (water heaters, tanks, reservoirs and basins) favor growth.

If an outbreak or cluster of Legionella is linked to a business or facility, it can be costly, both in terms of actual costs and lost revenue, and be potentially hazardous for patrons and employees. Therefore, the goal of a business or facility should be to minimize the risks of having such an event occur. The following are recommendations to control the growth of Legionella in water systems and HVAC systems:

**Water Distribution Systems:**

- When possible, maintain the temperature of water systems at temperatures hostile to Legionella bacteria; cold water below 68°F (20°C) and hot water above 140°F (60°C). Hot water should be circulated with a minimum return of 124°F (51°C).
- Periodically inspect and clean water handling systems following manufacturer’s recommendations and drain and clean holding tanks.
- Periodically clean hot water storage tanks, ice machines and equipment that filter potable water.
- Periodically remove and clean showerhead and faucet aerators.
- Disinfect hot water systems regularly (semi-annually) with thermal disinfection (raising the water temperature and flushing the water system) and/or shock chlorination (increasing the chlorine levels in the water system and flushing it).
Thermal disinfection – is done by flushing each outlet for more than five minutes with water at 160°F to 170°F (71°C to 77°C).

Shock chlorination - is done using water containing more than 2ppm free chlorine residual. Each outlet should be flushed until the odor of chlorine is detected. Chlorine should remain in the system for a minimum of two hours.

- Systems should be inspected annually to ensure that all thermostats are functioning properly.
- When planning new construction, anti-scald valves should be installed on all hot water outlets so water temperatures in the distribution system may be set high enough to control Legionella.
- If possible, recirculation loops in the hot water distribution system should be used to minimize stagnation.
- Plumbing designs should be reviewed and dead-legs (dead-end capped lines) should be eliminated.

HVAC Systems:
- Use halogen oxidizers (continuous or intermittent, although continuous is preferred) for HVAC systems.
- Minimize the use of water reservoirs, sumps and pans in HVAC systems.
- Provide a way to drain water sumps when not in use (HVAC systems).
- Slope and drain sumps from the bottom so that all of the water can drain out and allow the pan to dry (HVAC system).
- Locate HVAC fresh-air intakes so they do not draw mist from a cooling tower, evaporative condenser or fluid cooler into the system.
- Keep accurate and complete maintenance records.

Other water systems (decorative fountains and waterfalls):
- Regular cleaning is recommended.
- Use of filters should be considered. Systems with small water volumes may be drained and refilled with fresh water weekly in lieu of filtering.
- A biocide for use in decorative fountains may be used.

Section 3 – Working with Public Health on a Legionellosis Investigation

The Centers for Disease Control and Prevention (CDC) report that about 21% of all people that become infected Legionella were exposed to the bacteria while traveling, which is referred to as travel-associated legionellosis. Hotels, motels and other such facilities are a common source for travel-associated Legionella cases.

Following the identification of a confirmed cluster or outbreak of legionellosis in which two or more individuals have a person, place, or time link to a business or facility, the Local Health Department will begin a disease investigation to identify the source of the illness. The purpose of
the investigation is to find out the source of the Legionella bacteria and to take action to prevent further illness from occurring.

In any infectious disease investigation, the purpose is to find the cause (or source) of the illness, and to take the necessary action(s) to prevent further illness from occurring. The intent of Public Health is to protect the health of the public.

In the event that a business/facility is identified as a possible source of a cluster or outbreak of legionellosis, the business/facility will be contacted by a local public health official from the Local Health Department.

**What can be expected when working with the Local Health Department on the disease cluster/outbreak investigation?**

First, a public health investigator will contact the business/facility that has an epidemiological link to the Legionella cases. The purposes of this initial contact are: to notify the business/facility of the situation, increase awareness of legionellosis, and to reduce the risk of Legionella transmission in the future. The CDC has provided a sample of an initial notification from a health department might send to a hotel regarding a cluster of legionellosis. This sample notification can be found at: [http://www.cdc.gov/legionella/files/hotel_letter.pdf](http://www.cdc.gov/legionella/files/hotel_letter.pdf).

To prevent further illness from occurring, it is important for the business/facility to work closely with the Local Health Department. The following is a list of what to expect while working with the Local Health Department on the disease investigation, sample collection and testing, and cleanup (remediation) for the legionellosis cluster/outbreak.

1. **Working with a Local Health Department on the disease investigation.**
   
   a. **Environmental Assessment:**

   The priority of the Local Health Department is to protect the health of the public by identifying the source of the Legionella bacteria. Once the source is known, efforts must be made to eliminate the Legionella bacteria so that no more people are exposed and become ill. The Local Health Department isn’t there to ruin a business or to shut a business down. Public Health wants to work with the business/facility to ensure that any patrons of the business/facility are no longer at risk of becoming infected with the Legionella bacteria.

   The environmental assessment is one of the first items that will need to be done as part of the investigation. The objective of the environmental assessment is to determine the source of the outbreak of legionellosis.

   Water and swab samples will be gathered and tested for the presence of Legionella bacteria. Depending on the type of business or facility, certain parts or all of the business or facility may need to be closed while the environmental assessment is conducted.
The environmental assessment is done by collecting 1-liter water samples and swab samples from sites where the Legionella bacteria can grow and amplify. Such sites may include: sinks, showerheads, hot water systems, cooling towers, HVAC systems, spas, water fountains, etc.

The sites chosen for water and swab sample collection should not be random. A sampling plan should be developed prior to collecting any samples. To develop the sampling plan, the Local Health Department will work with the business/facility to review the plumbing scheme and other information to determine the best sites for sample collection. The plan should be reviewed by both the person conducting the environmental assessment and the business owner/facility manager to ensure that adequate samples are collected. Potential exposure information that has been gathered from interviews with Legionella cases linked to the cluster or outbreak will be used to determine some of the sampling sites in the plan as well.

The CDC has guidelines for collecting water and swabs samples that can be found at: http://www.cdc.gov/legionella/.

Samples collected from the environmental assessment should be sent to the Unified State Laboratories: Public Health for testing. There is a cost associated with testing. It is the responsibility of the business/facility to pay for testing. Questions regarding the environmental assessment can be directed to the Local Health Department.

If test results from the water and swab samples come back positive for Legionella bacteria, further steps will need to be taken at the business/facility to remove the Legionella bacteria. Remediation measures to remove Legionella bacteria can include (but are not limited to): thermal pasteurization, shock chlorination, and flushing the water system.

It is the responsibility of the business or facility to do the remediation. This can be done by the business/facility or contracted out to a plumber or other specialist with the necessary experience and expertise to successfully address the problem.

The Local Health Department may require that the business/facility provide a letter stating what remediation work was done and by whom.

After remediation, follow-up water sampling should be done to ensure that re-colonization of the Legionella bacteria has not occurred. The time frame and frequency for regular follow-up sampling should be discussed with the Local Health Department.

b. Notification of patrons of possible exposure to legionellosis:

If water and swab samples test positive for Legionella, patrons who have visited the business or facility during a specified time period should be informed of the possible exposure they may have had to the Legionella bacteria.
The Local Health Department may request that the business/facility provide a list of patrons who have visited the business/facility during a specified time period. Patrons and employees should be contacted and notified of their possible exposure to Legionella bacteria.

Patron and employee contact is done to inform the patron and/or employee of the possible exposure to the Legionella bacteria and to improve their chances of receiving proper medical attention if symptoms do develop. Information should be given to exposed individuals on what to do if symptoms of legionellosis appear. Getting information out to patrons/employees also serves as a way of finding out if more cases of legionellosis have occurred that were not initially reported or identified.

2. **Potential partners that may be involved in different aspects of the disease investigation, water testing and remediation efforts should be notified of the situation early on in the process.**

Other groups or individuals exist that may have an interest in the legionellosis situation. It is important to contact these groups and individuals at the beginning of the process to ensure that work to identify the source of the illness and to eliminate it are done as quickly as possible and not delayed.

Potential partners may include, but are not limited to: the local water municipality, city/county attorney, plumber, remediation specialist, etc.

3. **Possibility of temporary closure of business or facility.**

Rarely, a business or facility may need a complete or partial closure. However, if a complete or partial closure is needed, it will likely occur during the following times: during the environmental assessment; in the event of positive water samples, until remediation measures can be performed; during remediation; any time follow-up testing shows the presence of Legionella bacteria.

The authority to order such a closure comes from the Utah Code, Title 26A, Chapter 01 “Local Health Departments”, section 114 “Powers and duties of departments” ([http://le.utah.gov/~code/TITLE26A/htm/26A01_011400.htm](http://le.utah.gov/~code/TITLE26A/htm/26A01_011400.htm)).

4. **Follow-up water sampling and testing.**

The Local Health Department may require the business or facility to do follow-up water sampling and testing to verify that there has been no re-colonization of Legionella bacteria in the building’s water system. The follow-up water sampling and testing should follow protocol and should be consistent with sites sampled and tested as part of the environmental assessment.
It is the responsibility of the business/facility to conduct the follow-up water sample collection and testing. The Local Health Department may offer assistance depending on available resources.

### Additional Information and Resources

**Additional Information**

For additional information or for questions regarding Legionella contact the Utah Department of Health – Bureau of Epidemiology by calling 801-538-619 or by email epi@utah.gov; or contact your Local Health Department.

| Bear River Health Department  
  (Box Elder, Cache, and Rich Counties)  
  435-792-6500 | Summit County Public Health Department  
  435-333-1500 |
| Central Utah Public Health Department  
  (Juab, Millard, Piute, Sanpete, Sevier, and Wayne Counties)  
  435-896-5451 | Tooele County Health Department  
  435-277-2300 |
| Davis County Health Department  
  801-451-3340 | Tri-County Health Department  
  (Daggett, Duchesne, and Uintah Counties)  
  435-781-5475 |
| Salt Lake Valley Health Department  
  801-468-2750 | Utah County Health Department  
  801-851-7000 |
| Southeastern Utah District Health Department  
  (Carbon, Emery, Grand, and San Juan Counties)  
  435-637-3671 | Wasatch County Health Department  
  435-654-2700 |
| Southwest Utah Public Health Department  
  (Beaver, Garfield, Iron, Kane and Washington Counties)  
  435-986-2540 | Weber-Morgan Health Department  
  (Morgan and Weber Counties)  
  801-399-7100 |

**Resources:**

  This website has links to information regarding environmental assessment procedures, water sampling guidelines, specimen collection and management, and other related information.