



# Legionellosis Outbreak at the Orleans Hotel and Casino, 2022-2023 Las Vegas, Nevada

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**PUBLIC HEALTH INVESTIGATION FINAL REPORT**

Southern Nevada Health District  
DIVISION OF DISEASE SURVEILLANCE & CONTROL | LAS VEGAS, NEVADA

This report presents findings of the Southern Nevada Health District's investigation into a Legionellosis outbreak associated with the Orleans Hotel and Casino during December 16, 2022 and March 4, 2023.

### **Acknowledgements**

We gratefully acknowledge the staff from the following offices and agencies for their contribution to this investigation and for their continuing collaboration.

- Office of Acute Communicable Disease Control
- Office of Informatics and Epidemiology
- Division of Environmental Health
- Office of Communications
- Rocky Mountain Poison and Drug Center (RMPDC)

## **INTRODUCTION:**

On 1/27/23 the Southern Nevada Health District (SNHD) received report from the Centers for Disease Control and Prevention (CDC) Respiratory Diseases Branch of two cases of confirmed Legionnaires' disease in persons who had stayed in the Orleans Hotel and Casino during the incubation period of the disease. This report was part of the national surveillance system to detect cases among travelers.

Case #1 had illness onset in December 2022 and Case #2 had illness onset in January 2023, approximately two weeks apart. Both cases were laboratory confirmed through urine antigen testing; no culture isolates from cases were available.

In response to this report, SNHD's Division of Disease Surveillance and Control (DSC) partnered with SNHD's Environmental Health (EH) Division team and began an initial investigation at that time, followed by EH inspection on 2/7/23.

During the original EH inspection on 2/7/23, facility representatives were educated on water management programs and water sampling. The Orleans agreed to test the recommended sites. The SNHD EH team accompanied the Orleans' water management representatives to observe the sampling process of affected rooms. Testing was completed for the room of Case #1 on 2/7/23 and room of Case #2 on 2/9/23. Environmental testing returned positive for *Legionella pneumophila* serogroup 1 (Lp1) in both rooms on 2/24/23.

Based on the Centers for Disease Control and Prevention case definition and the *SNHD Protocol for Legionella Investigations*, an outbreak is declared when two or more cases are associated with the same facility whereby environmental evidence suggests a common source of infection. An outbreak investigation was initiated on 2/27/23. The primary objective of this outbreak investigation was to identify the source(s) of infection, eliminate the source of infection, and to prevent additional cases.

## **BACKGROUND:**

Legionnaires' disease is a pneumonia caused by the bacteria *Legionella*. About 10,000 cases of Legionnaires' disease were reported in the United States in 2018. However, because Legionnaires' disease is likely underdiagnosed, this number may underestimate the true burden of disease. More recent studies have estimated that the true number of Legionnaires' disease may be 1.8-2.7 times higher than what is reported. This disease is a reportable infection and is commonly investigated for travel-related exposures. People can acquire the infection by breathing small water droplets in the air that contain *Legionella*. *Legionella* is naturally found in freshwater environments, like lakes and streams, but it can become a public health problem when found in human made water systems such as cooling towers, hot tubs, showers, faucets, decorative fountains, water features, and large plumbing systems.

Legionellosis can be difficult to diagnose in ill individuals because the symptoms are similar to other respiratory diseases and can include cough, shortness of breath, fever, muscle aches, and headaches. These symptoms usually begin 2 to 10 days after being exposed to the bacteria, but they can take longer. Diagnostic testing can be done by a physician if they order tests on urine or sputum samples. Legionnaire's disease can be serious, but it can also be treated with antibiotics. Those most at risk for developing illness after being exposed are those who are current or former smokers, have a chronic lung disease, and/or have a weakened immune system.

*Legionella* can also cause a milder infection called Pontiac fever. Symptoms are primarily fever and muscle aches and can begin between a few hours to 3 days after exposure, and usually last less than a week.

## INVESTIGATION METHODS:

### Epidemiologic

The Division of Disease Surveillance and Control staff obtained additional information regarding both cases from the local department of public health associated with the cases, as well as confirmation of hotel stay including room information on 1/30/23 and 2/2/23 respectively. Initial site visit occurred on 2/7/23 to verify the stays in the hotel database with Orleans Management.

The Nevada Division of Public and Behavioral Health (NVDPBH) Office of Public Health Informatics and Epidemiology (OPHIE) was informed about the outbreak investigation on 2/27/23, once preliminary environmental results were available.

### Case Definitions:

#### Confirmed Legionnaires' disease Case:

A person who stayed overnight, worked at least one shift or attended a convention or multi-day event at the Orleans Hotel and Casino between December 16, 2022 and March 4, 2023 and:

- Became ill (with symptoms of pneumonia) between two days after arriving and fourteen days after leaving, **AND** met one of the following clinical criteria
  - Received care (as an inpatient or outpatient) for one or more symptoms consistent with pneumonia (fever equal or greater than 101° F, chills, cough, fatigue, or weakness) **OR**
  - Received antimicrobial treatment\* that is effective against *Legionella* and another pneumonia causing organism was not isolated **OR**
  - Had radiographically confirmed pneumonia
- **AND** Had positive laboratory testing for *Legionella pneumophila* by one of the following methods:
  - Isolation of any *Legionella* organism from lower respiratory secretions, lung tissue, pleural fluid, or extrapulmonary site
  - Detection of any *Legionella* species from lower respiratory secretions, lung tissue, pleural fluid, or extrapulmonary site by a validated nucleic acid amplification test
  - Detection of *Legionella pneumophila* serogroup 1 antigen in urine using validated reagents
  - Fourfold or greater rise in specific serum antibody titer to *Legionella pneumophila* serogroup 1 using validated reagents

*If any criteria for the definition are unknown (e.g., receipt of antibiotics) and the case otherwise meets the definition, assume that the missing criteria exists for investigation purposes.*

#### Probable Legionnaire's disease Case:

A person who stayed overnight, worked at least one shift or attended a convention or multi-day event at the Orleans Hotel and Casino between December 16, 2022 and March 4, 2023 and between two days after arriving and fourteen days after leaving:

- Received care (as an inpatient or outpatient) for fever equal or greater than 101° F and one or more symptoms consistent with pneumonia (chills, cough, fatigue, or weakness) and received antimicrobial treatment\* that is effective against *Legionella* and another pneumonia causing organism was not isolated (such as *S. pneumoniae*), but did not have a radiological test for pneumonia **OR**
- Had clinical or radiographic pneumonia.

#### **Confirmed Pontiac Fever Case:**

A person who stayed overnight, worked at least one shift or attended a convention or multi-day event at the Orleans Hotel and Casino between December 16, 2022 and March 4, 2023, and:

- Became ill between 5 hours after arriving and 3 days after leaving, **AND**
  - Had a fever and one or more of the following symptoms: chills, cough, myalgia, or fatigue
- **AND** Had positive confirmatory laboratory testing by one of the following methods:
  - Isolation of any *Legionella* organism from lower respiratory secretions, lung tissue, pleural fluid, or extrapulmonary site
  - Detection of any *Legionella* species from lower respiratory secretions, lung tissue, pleural fluid, or extrapulmonary site by a validated nucleic acid amplification test
  - Detection of *Legionella pneumophila* serogroup 1 antigen in urine using validated reagents
  - Fourfold or greater rise in specific serum antibody titer to *Legionella pneumophila* serogroup 1 using validated reagents

#### **Probable Pontiac Fever Case:**

A person who stayed overnight, worked at least one shift, or attended a convention or multi-day event at the Orleans Hotel and Casino between December 16, 2022 and March 4, 2023, and:

- Became ill (fever and 1 of the following - chills, cough, myalgia, or fatigue) between 5 hours after arriving and 3 days after leaving, **AND**
- Had negative or no laboratory testing for *Legionella pneumophila* serogroup 1 in urine using validated reagents, **AND**
  - Had no positive tests for other URI agents in the appropriate time frame

#### **OR**

- Did not seek medical care at time of illness, but reported having a fever and one or more of the following symptoms:
  - Chills, cough, myalgia, or fatigue

\*Recommended treatment is either a respiratory fluoroquinolone, such as levofloxacin or a macrolide (azithromycin). Doxycycline and trimethoprim-sulfamethoxazole are alternative drugs (Red Book, 30<sup>th</sup> edition 2015)

\*SNHD will verify all exposures to Orleans from self-reported cases by requesting confirmation emails from the hotel showing dates of stay or other means to confirm exposure during the reported time frame.

#### **Case Finding:**

SNHD began case finding efforts on 3/3/23. A secure notification was distributed to public health professionals

through the CDC Epidemic Information Exchange (Epi-X) across the United States on 3/6/23, requesting states to report to SNHD cases of Legionnaire's disease associated with travel to Las Vegas. A press release was issued on 3/3/23 and posted to the SNHD website. The Rocky Mountain Poison and Drug Center (RMPDC) phone line was activated to field calls associated with this event because a high call volume was anticipated. A frequently asked questions (FAQ) document was developed and forwarded to RMPDC representatives. RMPDC staff was instructed to forward calls from healthcare providers immediately to DDSC. Calls from persons reporting illness were referred to DSC via email and assigned to investigators for follow-up. Callers were asked to confirm their dates of stay at the facility and were requested to provide medical records to verify illness meeting the confirmed outbreak case definitions.

Orleans management sent letters to all guests staying at its facility between 12/16/22-3/21/23. The letters informed guests of their possible exposure risk and recommended they seek medical attention if they became ill with symptoms of legionellosis within 14 days of their stay. Initially notification letters were limited to the tower in which both cases had stayed but was expanded to all towers on 3/20/23 dating back to 12/16/22 based on results from additional room testing. The web link to the SNHD Legionellosis FAQ and an SNHD INFO line phone number was contained within the letters.

A survey to identify cases of Legionnaires' disease or Pontiac fever was designed and the link to the survey was posted to the SNHD FAQ website regarding this outbreak. Those who received the letters from the Orleans could access the survey by checking the web link which was included in the letters.

### **Microbiological**

All confirmed cases of Legionnaires' disease associated with this outbreak were laboratory confirmed using urine antigen testing.

Environmental water collection and sampling conducted by SNHD utilized the CDC's "Protocol for collecting environmental samples for *Legionella* culture during a cluster or outbreak investigation or when cases of disease may be associated with a facility" as a guide. Samples were collected by SNHD's EH staff and samples were shipped to Veritas Laboratories for *Legionella* testing.

Additional water samples were collected and tested by a third-party water management consultant.

### **Environmental**

Environmental Health staff conducted initial site testing at the Orleans Hotel with hotel management. On 2/7/23, an EH Specialist accompanied the Orleans' facility staff as water samples were collected for *Legionella* testing. Samples were obtained from the room where Case #1 stayed, including the sink, shower, and hot water return. In total, 9 environmental samples of the hot water system were taken. On 2/9/23 samples were obtained from the room where Case #2 stayed, including the sink and shower. In total, 4 environmental samples of the hot water system were taken.

On 2/7/23 EH staff conducted a complete survey of the facility. This included reviewing the plant used to create hot water, the cooling towers, and the outdoor pools and spas. Pools and spas were determined to not be potential exposure sites as they were not in service over the winter months

On 2/28/23, EH staff advised the facility to remediate the affected water systems, based on lab results from initial samples. Loop remediation was completed on 3/4/23.

## **RESULTS:**

### **Epidemiologic Results:**

#### **Call Center Results:**

SNHD anticipated a moderate volume of incoming calls after the release of the first Orleans notification letters and the media release on 3/3/23. The SNHD INFO line was activated and available on 3/3/23 and was de-activated on 4/10/23. Overall, 88 calls were received. Callers who indicated signs or symptoms of Legionnaires' disease or that had additional questions were referred to DSC for follow up.

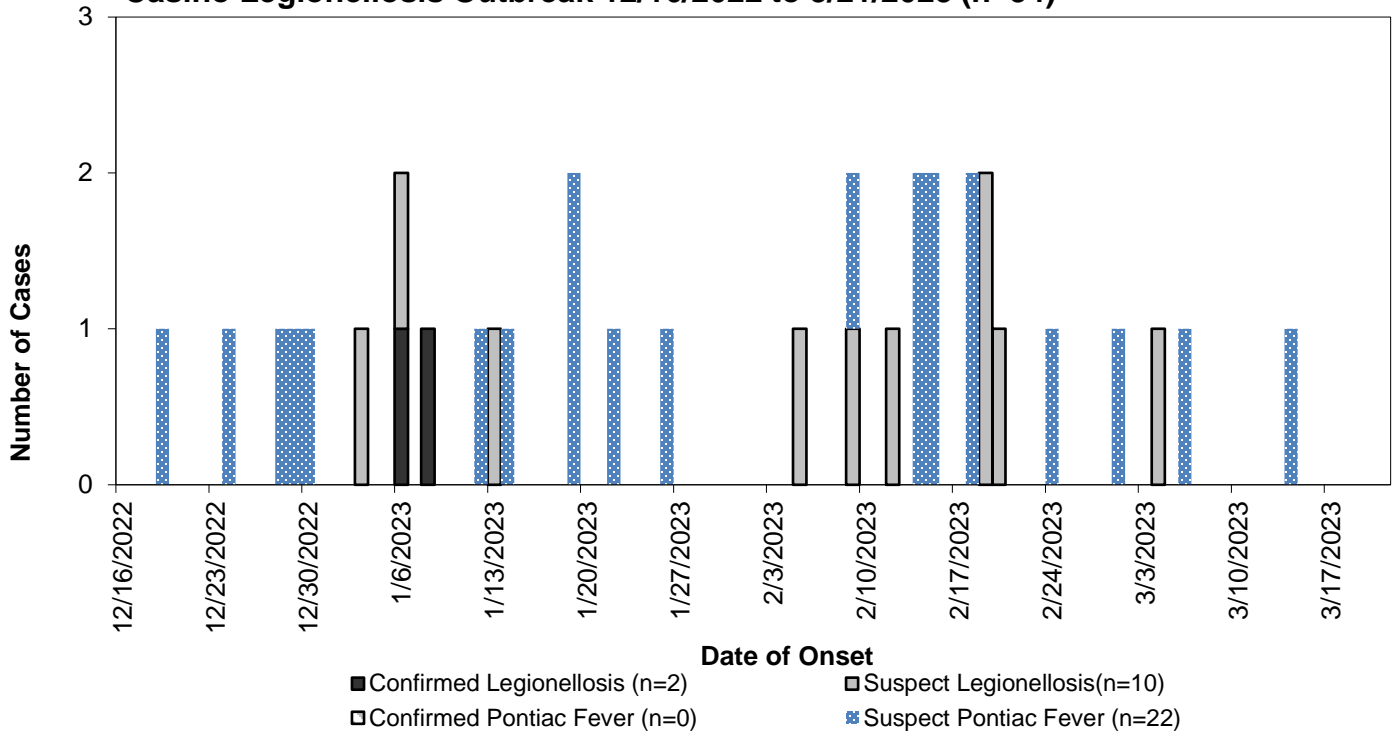
#### **Case Finding Results:**

No additional cases were identified as a result of the posting to EPI-X. In the first round of notifications, the Orleans issued 6,211 emails and 17,498 letters notifying guests of possible exposure. In the second round of notifications, an additional 1,822 emails and 4,194 letters were sent.

As of April 10, 2023, when the online survey was closed, DSC received 336 responses from the online survey, 283 of which were completed (Orleans guests with contact phone numbers and/or emails present). The completed records were screened by members of the Office of Informatics and Epidemiology (OIE). Records that were deemed to possibly meet the case definitions were then forwarded to the Disease Investigation and Intervention Specialists (DIIS) for further interview and evaluation. With responses from the online survey and phone calls combined, DSC investigated 116 possible cases, none of which were identified as confirmed Legionnaire's disease, 10 were classified as probable Legionnaire's disease and 22 were classified as probable Pontiac Fever. The last confirmed case associated with this outbreak reported a stay in December 2022.

The epidemiological curve for this outbreak is shown in Figure 1 below.

**Figure 1: Onset of Illness for Cases Associated with The Orleans Hotel and Casino Legionellosis Outbreak 12/16/2022 to 3/21/2023 (n=34)**



**Environmental Results:**

Environmental water sampling results from the Orleans, throughout the investigation are indicated in Table 1.

Random testing of 1% of additional guest rooms was performed prior to remediation on 3/1/23. Five additional rooms were identified with *Legionella* detectable. These rooms were placed out of order, and all rooms had been treated with loop remediation performed on 3/4/23 as noted previously.

Post-remediation testing performed on 3/6/23 and 3/8/23 did not detect *Legionella*.

**Table 1: Summary Environmental Water Sampling Results**

Date of sampling	Number of samples detecting <i>Legionella spp.</i>
2/7/2023	6/9
2/9/2023	4/4
3/1/2023	10/37
3/6/2023	0/4
3/8/2023	0/28



## **DISCUSSION:**

The causative agent of this outbreak was identified as *Legionella pneumophila* and confirmed to be present throughout the property. Since mode of transmission is inhalation of water droplets, risk factors would be any activity at the property that could expose people to water spray such as showering, bathing, and recreational water use. After appropriate remediation, testing ensured that the contamination was eradicated.

Timely notifications of travel-associated Legionnaires' cases from other jurisdictions and from the CDC is important in reducing the response time and initiating both epidemiologic and environmental investigations. In this outbreak investigation, SNHD conducted a site visit at the Orleans within 6 business days of notification of the first case. This outbreak investigation highlights the importance of collaboration between epidemiology, environmental health, laboratory services and the hotel industry.

The investigation also demonstrates the need for SNHD to continue educational outreach efforts in local hotels. Facilities with large scale water systems, large water features, and public hot tubs are encouraged to develop a water management plan to reduce the growth and spread of *Legionella*. The Centers for Disease Control and Prevention has created a toolkit for industry titled, "Developing a Water Management Program to Reduce *Legionella* Growth and Spread in Buildings: A Practical Guide to Implementing Industry Standards 13.2". SNHD recommendations to local facilities adhere to CDC guidelines for the prevention and control of Legionnaires' Disease.

Approximately 10-15% of nationally reported legionellosis cases reported travel during the incubation period of their illness. These travel associated Legionnaires' disease outbreaks can occur in settings such as hotels, resorts and cruise ships. The Legionellosis Branch (NCIRD/DBD/RBD) at the Centers for Disease Control and Prevention has a critical role in providing notifications to local health authorities of cases that may be associated with travel. Effectively designed hotel water management plans can serve to control *Legionella* growth and prevent travel-associated legionellosis cases. Water management and legionellosis prevention are key to preventing Legionnaires' Disease Outbreaks. SNHD will continue to work closely with industry leaders in Clark County to take action in preventing outbreaks.

## **RESOURCES:**

Developing a Water Management Program to Reduce *Legionella* Growth and Spread in Buildings: A Practical Guide to Implementing Industry Standards 13.2. (2017, April 26). Last visited on March 27, 2018, from <https://www.cdc.gov/legionella/maintenance/wmp-toolkit.html>

Legionnaires' Disease Fact Sheet. (2016, July 18). Last visited on March 27, 2018, from <https://www.cdc.gov/legionella/about/signs-symptoms.html>