



# Legionella

## WHAT IS LEGIONELLA?

Legionella is a bacteria that can cause Legionellosis, also known as Legionnaires' Disease (a serious lung infection). There are close to 60 species of the bacterial genus Legionella, and Legionella pneumophila is responsible for the majority of human cases.

Legionella multiplies and survives within a temperature range of 77°F to 108°F (25°C to 42°C).

## WHAT ARE THE SOURCES OF LEGIONELLA?

Legionella is ubiquitous in the environment and is found in hot and cold water taps, creeks, ponds, and surrounding soil. Potting soil has also been associated with cases of Legionellosis, though the mechanism is unknown. Legionella does not transmit from person to person.

For water, the route of exposure is through aerosolization or inhalation. Exposure has been associated with hot water systems, air conditioning cooling towers, evaporative condensers, mist machines, decorative fountains, respiratory therapy devices, humidifiers, hot tubs, and whirlpool spas.

## WHAT ARE THE RISKS?

For many people exposure to Legionella will have no effect; however, for others it may cause mild symptoms, such as headache and fever. A small percentage of people exposed will become seriously ill. The elderly, smokers and persons with chronic lung disease are at higher risk for infection. Also at increased risk are immunocompromised individuals such as those with cancer, diabetes, or AIDS. Symptoms of the disease will usually appear 2 to 10 days after exposure.

The annual incidence of Legionellosis nationally is between 20 and 25 cases per million people since 2015. In San Francisco, it is between 1 and 5 cases per million people since 2015.

## CONTROL AND MONITORING FOR LEGIONELLA IN DRINKING WATER

The Environmental Protection Agency (EPA) has an established Maximum Contaminant Level Goal (MCLG) of zero for the presence of Legionella in drinking water. The SFPUC meets this non-enforceable guideline through compliance with EPA's Surface Water Treatment Rule, which requires water systems to filter and/or disinfect water so that microorganisms are removed and/or inactivated.

## HOW CAN LEGIONELLA BE CONTROLLED IN RESIDENTIAL HOMES?

Residential customers can reduce or eliminate potential exposure to Legionella by setting their hot water tank temperature above 140 F (60 C). This is in accord with U.S. Centers for Disease Control (CDC) guidelines and Standard 188 by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), which specifies how to set up and implement a water management program to control Legionella.

However, maintaining such high water temperatures can introduce a scalding risk, so thermostatic mixers may be used to minimize this risk.

## WHAT ARE LARGE BUILDING BEST PRACTICES FOR CONTROL OF LEGIONELLA?

The most common location for getting Legionellosis is in large buildings, such as hotels and hospitals. Large building owners should follow the ASHRAE Standard 188.

## WHAT ARE GREEN BUILDING GUIDELINES TO MINIMIZE LEGIONELLA?

Although Green Building designs can provide significant environmental benefits, they can also pose unique challenges related to Legionella due to elevated water age and loss of chlorine or chloramine residual. When designing Green Buildings, special features such as automated dead-end flushing should be considered. In addition, ASHRAE Standard 188 and other references by EPA, CDC, etc. should be followed. See list of references on back of this fact sheet.

The SFPUC uses chloramine for a residual disinfectant in the distribution system, and this is superior to chlorine for Legionella control.

Even with these processes, however, small amounts of Legionella can survive, and, given the proper conditions, can colonize in plumbing systems. Consequently, a key element for controlling Legionella is the design and maintenance of cooling towers and plumbing systems to limit Legionella growth and aerosolization.

Increasing the temperature of hot water systems and ensuring proper biocide treatment of cooling towers may limit exposure to Legionella.

Building and hospital standard operational procedures are used to prevent growth and transmission of Legionella. Effective control measures include disinfection, copper-silver ionization, maintenance of cooling towers, maintaining water in hot water storage tanks at temperatures above 140°F (60°C) and ensuring circulating water is higher than 124°F (51°C). Maintaining such high water temperatures can introduce a scalding risk, so thermostatic mixers may be used to minimize this risk.

## CONTROL AND MONITORING FOR LEGIONELLA IN DRINKING WATER

In the United States, public water systems are required to maintain either a chlorine residual or a chloramine residual in distribution systems. From 2003 to 2005, the U.S. Centers for Disease Control and Prevention (CDC), San Francisco Department of Public Health (SFDPH), and San Francisco Public Utilities Commission (SFPUC) conducted a special study of Legionella during the SFPUC conversion from chlorine to chloramine. Based on monitoring at 53 buildings in San Francisco, conversion to chloramine reduced the occurrence of Legionella colonies in hot water systems from 60% to 4% (AWWA, 2008).

### CONSUMER RESOURCES: REGULATION/HEALTH

- WHO: “Legionella and the Prevention of Legionellosis” (2007)  
[http://www.who.int/water\\_sanitation\\_health/emerging/legionella.pdf](http://www.who.int/water_sanitation_health/emerging/legionella.pdf)
- CDC Legionella Information  
<http://www.cdc.gov/legionella/about/index.html>
- CDPH: “Legionellosis Fact Sheet” (2018)  
<https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/LegionellosisFactSheet.pdf>
- EPA: “Legionella: Drinking Water Fact Sheet” (2000)  
<https://www.epa.gov/sites/production/files/2015-10/documents/legionella-factsheet.pdf>
- EPA: “Surface Water Treatment Rule”  
<http://water.epa.gov/lawsregs/rulesregs/sdwa/swtr/>
- EPA: “Technologies for Legionella Control in Premise Plumbing” (2015)  
<https://www.epa.gov/ground-water-and-drinking-water/technologies-legionella-control-premise-plumbing-systems>
- SFPUC Annual Water Quality Report  
<http://sfwater.org/qualitymatters>
- SFPUC Public Health Goals Report (2019)  
<https://sfwater.org/Modules/ShowDocument.aspx?documentid=9149>
- SFPUC: “San Francisco Water Quality Protection Plan” (2008)  
<http://www.sfwater.org/modules/showdocument.aspx?documentid=4065>
- SFPUC Drinking Water Disinfection  
<http://www.sfwater.org/modules/showdocument.aspx?documentid=4131>
- AWWA: “Legionella Reduction after Conversion to Monochloramine for Residual Disinfection” (2008)  
<https://awwa.onlinelibrary.wiley.com/doi/full/10.1002/j.1551-8833.2008.tb09609.x>
- ANSI/ASHRAE Standard 188-2015 “Legionellosis: Risk Management for Building Water Systems”  
<https://www.ashrae.org/resources-publications/bookstore/ansi-ashrae-standard-188-2015-legionellosis-risk-management-for-building-water-systems>

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