

Case Study - Legionella Identification, Risk Assessment, Proactive Controls

Project Description: Water Screening, High Rise Office Building

Scope of Services: AET was contracted by a commercial property manager to identify and assess the sources of risk from Legionella Bacteria (LB) in the potable/non-potable water systems in a high rise office building. As there was no reported illnesses, AET was also tasked to develop/implement a proactive water screening schedule for LB in the building.

AET's Investigative Approach/Sampling:

1. **Potable Water Sources** (*domestic water taps, faucets, sinks, kitchen sprayer*): First draw 1000ml samples were collected at representative locations. A second final draw sample was also collected after the water source reached its maximum discharge temperature (1-5 minutes) and were archived for use if LB contamination was confirmed in the first draw sample.
2. **Non-potable water sources** (*roof cooling tower, drain water storage tank, display fountain*): 250ml samples were collected.
3. **HVAC:** A swab sample was collected from the condensate pan in the rooftop HVAC unit.
4. **Personal dehumidifier:** A swab sample was collected; humidifiers require regular cleaning and filter changing.

OSHA WATER SAMPLING GUIDELINES			
ACTION	COOLING TOWER	DOMESTIC WATER	HUMIDIFIER
Prompt cleaning and/or biocide treatment of the system	100 cfu/ml	10 cfu/ml	1 cfu/ml
Immediate cleaning and/or biocide treatment. Take prompt steps to prevent employee exposure	1,000 cfu/ml	100 cfu/ml	10 cfu/ml

AET's Experience: Legionella is a gram negative bacteria common in rivers and ponds and found in low concentrations in many municipal water systems. Legionella bacteria (LB) can grow significantly in cooling towers and cold/hot water systems within offices, hospitals, schools, etc. where stagnant water conditions are present and nutrients (biofilms and sediment) are found. Optimum growth temperatures for LB is 95°F - 115°F.

Inhalation of aerosolized small water droplets containing LB can result in a severe form of pneumonia know as legionaries disease. Legionaries disease usually develops 2 to 14 days after exposure to LB and begins with headache, high fever and chills and later includes symptoms such as cough, chest pain and shortness of breath. Pontiac fever is a milder lung infection caused by LB inhalation and usually lasts 2-5 days. Persons over 45 years old, smokers, and individuals suffering from chronic lung disease or kidney disease or weakened immune symptoms are most susceptible. These diseases are not contagious and cannot be transferred from one person to another.

Seven Proactive Controls

1. **Dead Legs:** Keep pipe lengths as short as possible and remove redundant piping to minimize stagnant water.
2. **Flushing:** All water outlets (hot and cold) should be flushed weekly (for at least 2 minutes); at risk outlets have not been used for over 4 days.
3. **Temperature:** LB does not grow in water with extreme temperatures. Cold water outlet temperature should be below 68°F and the hot water temperature above 122°F after 2 minutes running. The hot water storage tank should be above 140°F. Check/record temperatures at water outlets at least once annually (check limited use outlets monthly).
4. **Biofilms:** Keep cooling towers, HVAC components, etc. clean of rust, sludge, scale, algae and other bacteria.
5. **Treatment:** Use biocides to treat cooling towers. Check/record chlorine levels during water screening.
6. **Water Screening:** Establish a water screening program; Where positive LB is found, implement controls and retest every 3-6 months until 2 consecutive non-detectable readings are recorded.
7. **Recordkeeping:** Document everything

CONCLUSION: Maintaining proper water quality suppresses the growth of LB and inhibits development of biofilms which support growth of LB. The legionella screening program described herein continues to demonstrate non-detectable LB results. This program has been in effect since 2010; Nine consecutive screenings.

When you need professional help or advice, email Alan Sutherland, CIH, CHMM at a.sutherland@aetinc.biz or call 610-891-0114; We provide nationwide services; phone consultations are free. Check out the full range of environmental contracting/consulting services we provide at our website www.aetinc.biz.

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