FS No. 048-1024

Control of *Legionella*

DESCRIPTION:
Legionella pneumophila occurs naturally in water sources such as rivers, streams, and lakes as well as manufactured water systems such as air conditioning systems. It can cause a milder disease Pontiac Fever and also a potentially fatal disease Legionnaires' disease with an average mortality rate of 15–20%. Those most susceptible groups of people are the elderly, smokers, and the immunosuppressed.

TRANSMISSION:
The primary means of transmission is inhalation via water aerosols. Several mechanical systems utilizing water to produce jets, sprays or mists have been found to contain the *Legionella* bacteria, they include:

- Cooling towers
- Decorative fountains
- Large air conditioning systems
- Dental hygiene equipment
- Domestic hot water systems
- Respiratory therapy equipment
- Spas and whirlpools
- Humidifiers
- Eye wash stations and safety showers

CONTROL:
Understanding the conditions that promote the growth and amplification of *Legionella* bacteria is essential to its control. Factors that promote growth include:

Stagnant water – Stagnant water conditions lead to amplification of bacterial growth. This can occur either by lack of use (i.e., area shut down for maintenance) or a poorly designed plumbing system. Systems designed to maximize recirculation and minimize dead spaces can minimize stagnant water.

Water temperature – *Legionella* thrives in warm water temperatures of 68–122 degrees Fahrenheit (°F) with optimal growth at temperatures of 95–115°F. Ensuring water temperatures are outside these ranges will add in keeping *Legionella* population growth in check. In domestic water systems the potential for scalding must be considered, especially when children or the elderly occupy the building. The temperature should be kept below 160 °F. Several types of anti-scald valves are readily available and easy to install. Weekly or monthly water temperature checks should be part of the overall maintenance program.

Sediment, scale, deposits, bio-films – Sediment, scale, and bio-films support the growth of *Legionella* as well as other microbiota which also support *Legionella* growth. In addition, certain types of amoebae and other protozoans exist as endosymbionts with *Legionella* bacteria allowing the bacteria to live within the organism and resist harsh environmental conditions.

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Control measures include equipment selection, system maintenance, and chemical treatment. Proper equipment selection can reduce stagnant water and transmission of Legionella containing aerosols. Selecting appropriately sized water tanks can aide in controlling Legionella growth. An oversized tank will result in water stagnation while an undersized tank may result in insufficient water temperature. Avoid using faucet aerators. Using instantaneous heaters rather than tanks may be an option. Water filters do not remove Legionella and may promote growth. Avoid the use of unnecessary filters. When filters are used they should be cleaned and replaced at regular intervals.

System maintenance will not only promote an efficient system but will also aide in controlling Legionella growth by reducing the numbers of other microorganisms that harbor the Legionella bacteria. Examples of maintenance include:

- Identifying and removing dead legs (piping that is capped off and has no flow).
- Regular flushing of water heaters, water tanks, emergency showers and infrequently used outlets. Remove and disinfect faucet aerators and shower heads.
- Replacing heavily scaled fixtures.
- Remove or minimize rubber, plastic, silicone gaskets and washers.
- Ensuring that water pumps are used regularly (sitting idle for more than 24 hours) and flushing idle taps, safety eyewash/showers weekly.
- Fixing leaks to prevent contaminated water from entering the building's heating, ventilating and air conditioning (HVAC) system ductwork.
- Install backflow prevention devices between potable and non-potable water systems. Test and inspect them annually.

Chemical treatment may include adding water softeners to reduce iron content, scale and corrosion inhibitors, and pH conditioners. A variety of chemical and physical treatment methods are used to control Legionella growth, including but not limited to; Chlorination, Ozonation, Copper-silver ionization, Heat and flush (heat shock) and Ultraviolet radiation. Chlorination is the most widely used; however, when used it must be monitored carefully. High levels corrode metals while low levels are ineffective against reducing Legionella growth.

Effectiveness of microbial control can best be accomplished through visual inspection and monitoring for microbial populations. Specific control measures may be required for each of the mechanical water systems listed above. Control measures for cooling towers and domestic hot water systems can be found in the American National Standard Institute (ANSI)/American Society of Heating Refrigeration and Air-Conditioning Engineers (ASHRAE®) Standard 188-2015 "Legionellosis: Risk Management for Building Water Management Systems", and The Occupational Safety and Health Administration (OSHA) Technical Manual, Chapter 7, "Legionnaires Disease."