



FOUR STEPS TO CONTROLLING *LEGIONELLA* GROWTH IN COOLING TOWERS

Taking these measures can prevent disease outbreaks such as Legionnaires’

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No building should be making people sick; however, because of poor maintenance and cleaning efforts, the water in cooling towers has the ability to serve as the breeding ground for a variety of bacteria. One such bacterium is *Legionella*, which is the root cause of the recent Legionnaires’ outbreak in New York City that has sadly claimed several lives and sickened many people.

However, this situation is completely avoidable since technologies exist today to ensure cooling towers are kept clean. The dust and debris that bacteria like to propagate in can be removed and kept out through proper maintenance, filtration, water treatment and monitoring. This will control the growth of bacteria, such as *Legionella*, and ensure that outbreaks, such as Legionnaires’, are prevented.

Cooling Towers and *Legionella*

Cooling towers are an energy-, space- and cost-effective way to remove heat generated by centralized air-conditioning systems from large buildings. The towers do this by using water and an evaporation process to pull the heat away and transfer it outside, thus creating a comfortable indoor environment.

An unwanted byproduct of this process is the collection of dust and debris that settles in the basin of the cooling tower. The problem is that if the cooling tower is left unmaintained, then bacteria will flourish in this particle concoction due to the presence of ideal growing conditions, which for *Legionella* include:

- Warm water stagnation
- Water temperatures from 68°F to 122°F with an optimal growth range of 95°F to 115°F
- pH levels between 5.0 and 8.5
- Sediment that tends to promote the growth of commensal microflora

- The presence of microorganisms, including algae, flavobacteria and Pseudomonas, which supply essential nutrients and protection¹

Controlling *Legionella* Growth in Cooling Towers

If the proper steps for taking care of a cooling tower aren't followed, then *Legionella* growth is encouraged. In order to control *Legionella* bacterial growth and consequently prevent disease outbreaks, there are four key steps to take for establishing a clean cooling tower that performs to expectations. These steps consist of: regular maintenance, systematic filtration, water treatment and continuous monitoring.

1. Regular Maintenance

Cooling towers continuously wash the air as they operate, and because of this they are constantly collecting debris. The first step in removing what has settled in the tower and thus keeping it as clean as possible is regular maintenance. This includes:

- Conducting ongoing inspections to identify any mechanical deficiencies
- Repairing any mechanical issues a cooling tower may have – such as leaks and broken panels, fans and infill – so it operates as designed
- Ensuring drift eliminators are sufficient and functional
- Performing regular cooling-tower cleanings

2. Systematic Filtration

Even if regular maintenance of the cooling tower is happening, dust and debris will still enter and collect in the basin of the tower. Therefore, the cooling-tower water must be filtered on a continuous basis to remove the debris at, or close to, the hypothetical rate of collection to impede build-up or accumulation. The specific goals of filtration include:

- Removing dust and debris that are pulled into the cooling tower
- Capturing organic compounds and biological organisms
- Eliminating food and hiding places that foster bacterial development

3. Water Treatment

Water treatment is also an essential component, and depends on the application and type of system, as well as the location. The process is specific to each building and the benefits include:

- Controlling scale formation
- Governing pH levels of the system water
- Reducing corrosion and fouling

¹ Ideal *Legionella* growing conditions provided by the Occupational Safety and Health Administration (OSHA); https://www.osha.gov/dts/osta/otm/otm_iii/otm_iii_7.html

- Avoiding biological contamination

4. Continuous Monitoring

Finally, continuous automatic system monitoring and commissioning are necessary for both enhancing water quality and system performance. This process consists of:

- Deploying equipment and software dedicated solely to monitoring cooling-system water
- Monitoring water quality and system efficiency
- Alerting building personnel to a potential decline in water quality
- Providing historical records of water quality

Innovative Technologies Available Today

There are many innovative technologies on the market today that can help control the growth of *Legionella* in cooling towers. Two of the most effective include:

Aquanomix's Symphony™

Symphony™ is a constant-commissioning analytics solution that examines building water quality in near real-time and alerts operators to any issues. It's impossible to manage what you don't measure, and Symphony™ will give an early indication of biofilm activity, which is usually a precursor to *Legionella* development. This helps to control bacterial growth and to maintain an efficient and reliable cooling system.

VAF Filtration Systems™

VAF solutions consist of state-of-the-art, self-cleaning screen filtration technology that can be applied to cooling towers. With basin water kept in perpetual motion, a VAF filter is able to screen out tiny particles of dust and debris, including sand, silt, scale particles, rust particles, algae and chemical residue. This precise filtration discourages the growth of *Legionella*.

In Sum

The Legionnaires' outbreak is a tragic and avoidable occurrence. Cooling towers should never be at the center of any disease epidemics since technologies exist today to ensure maximum cleanliness and operational efficiency. By following the process of proper maintenance, filtration, treatment and monitoring, the growth of *Legionella* in cooling towers can be controlled and the health of the public can be protected.

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