HOMEYER
CONSULTING SERVICES, INC.

TECHNICAL UPDATE
September 2009 Edition

Legionella Pneumophila bacterium
Dangerous but manageable in Cooing Tower Systems

Many facilities use cooling towers to provide a cost-effective method to cooling buildings and manufacturing sites. Water treatment programs are used to prevent scale formation and minimize corrosion and biological fouling. The main purpose for water treatment programs is to protect the equipment assets, but there are other health risks that you need to consider, namely Legionnaires Disease. ***There are still too many poorly treated cooling systems that potentially increase the risk for people to contract Legionnaires Disease.***

Legionella Pneumophila is a rod-shaped, aerobic bacteria that has over fourteen serogroups and 42 species present. Serogroup 1, however, is identified with 90% of *Legionnaires' disease* cases. Serogroups 5 and 6 seem to be the next most harmful types of bacteria. *Legionella* was first detected in the 1976 American Legion Convention at the Bellevue Stratford Hotel in Philadelphia, PA. A total of 34 attendees died and 221 people became ill as result of *Legionnaires Disease*. The symptoms of *Legionnaires Disease* are pneumonia-like, which include a high fever, headache, chills, and overall general discomfort.

It most commonly infects those who are elderly, smokers, and/or have respiratory problems. People who have weak immune systems or take drugs to suppress the immune system are also more likely to get sick from *Legionella* bacteria. Most of the people that contract *Legionella* inhale droplets of water (less than five microns in size) that contain the bacteria deep into the lungs. The incubation period is normally 2-10 days.

According to OSHA, it is estimated that over 25,000 cases occur each year and cause more than 4,000 deaths.

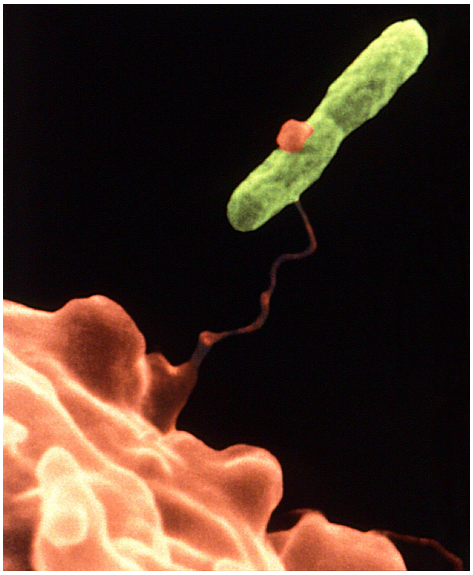
Legionella Risk Assessment Program:
All organizations should implement a Risk Assessment Program. This is an audit by qualified person(s) to determine the level or "Risk" of all aerosolized water systems where *Legionella* has a chance to amplify and then come in contact with people through exposure to that system.

Legionella Reaction Protocol: To Test or Not To Test?
If you test, there is a good chance you will find *Legionella*. However, before you test a system for *Legionella* you should have completed a Risk Assessment Plan that includes a Reaction Protocol prepared. A Reaction Protocol means *"what are we going to do when we find it?"* If testing is not done, we recommend following "Best Practices" when treating and maintaining the system.

"*Best Practices*" for biological control for cooling towers use a combination of two biocides; an oxidizing biocide such as bromine or chlorine, and a non-oxidizing biocide, such as isothiazoline, glutaraldehyde, and quaternary amine compounds. Just because you follow *"Best Practices" does not mean you do not have Legionella present.* However, the risk is much lower. Homeyer Consulting recommends the following microbiological levels be maintained for open cooling water systems:

Microbiological Activity in Cooling Towers:

<10,000 cells/ml of aerobic bacteria (dip slides)
<50 cells/ml of anaerobic bacteria (laboratory analyses)
<50,000 cells/ml of aerobic bacteria (swab samples from piping surfaces)
<100 cells/ml of anaerobic bacteria (swab samples from piping surfaces)



This electron micrograph depicts an amoeba, *Hartmannella vermiformis* (orange), as it entraps a *Legionella Pneumophila* bacterium (green) with an extended pseudopod. After it is ingested, the *Legionella Pneumophila* bacterium can survive as a symbiont within what then becomes its protozoan host. The amoeba then becomes what is referred to as a "Trojan Horse". By harboring the pathogenic bacteria, the amoeba can afford the protection and, in fact, in times of adverse environmental conditions, are able to meta-morph into a cystic-stage, enabling it and its symbiotic resident pathogens to withstand such environmental stresses. (This image is the courtesy of the Centers for Disease Control and Prevention and Dr. Barry S Fields.)

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