Microbiological Influenced Corrosion Identification, Testing and Control

Microbial Corrosion Can Affect The Efficiency Of Your Cooling Towers And Closed Loop Systems

One of the most "hidden" but potentially one of the most dangerous forms of corrosion in open recirculating waters as well as in closed loops, is Microbiologically Influenced Corrosion (MIC). Most Treatment Programs focus, and perhaps rightfully so on scale and corrosion control related to dissolved oxygen and carbon dioxide, but MIC, the hidden enemy, must not be neglected. We have said in the Water Treatment Industry that "you can't stop Mother Nature," but you can slow her down, and that is the job of those of us in the industry...to identify and control the "unseen enemy" whether it is dissolved gasses or microscopic living organisms.

Although there seems to general agreement on the types and numbers of microorganisms present in a system (whether open recirculating or closed loops), these numbers are difficult to "standardize" since the results of testing are indicative of the test from a sample taken at a point in time, and the samples are generally taken from the bulk water, where the real danger of MIC exists primarily in the biofilm. So it is very important to sample on a regular basis so that a history can be maintained, and action can be taken when indicators call for it. Some of the "standardization" that has been done for microbiological levels is shown below:

Species	Open Cooling	Source	Closed Loops	Source
Heterotrophic Bacteria (CFU/mL)*	10,000	ASHRAE/CTI	1000	Master Spec
Biofilm (colonies/in2)	100,000	CTI	No Data found	
Total Anaerobic Plate Count		No Data found	100	Master Spec
Sulfate reducing bacteria (CFU/mL)**	0	Master Spec	0	Master Spec
Denitrifying bacteria (CFU/mL)***	100	Master Spec	100	Master Spec
Fungi, Yeasts and Molds (CFU/mL)	0	Master Spec	0	Master Spec

* According to CTI the Total "Planktonic Counts" in Open Cooling systems should not exceed 10,000 CFU/ml. This would include Heterotrophs.
** This is included on the Master Spec. (SECTION 232500 - HVAC WATER TREATMENT).
*** See note above on the Master Spec.

Environmental Safety Technologies is poised and ready to help you with your MIC Testing needs. Our Laboratory is equipped, and our microbiological staff is fully trained in the interpretation of Microbiological species using the Biological Activity Reaction Test (BART).

Monitoring bacteria capable of causing corrosion, clogging, biofilm formation, and increased hygiene risk in various manufacturing, industrial, and commercial settings can reduce the impact of corrosion on your equipment. Microbial corrosion screening can assess the presence and level of activity of acid producing, iron related, sulfate reducing, nitrifying, denitrifying, and slime forming bacteria before these bacteria become detrimental to your facility's operations. By determining presence/absence and approximate count (aggressiveness) of bacteria known to cause corrosion of water systems in your facility a disinfection plan can be developed. Environmental Safety Technologies can provide monitoring services to help detect corrosion causing bacteria before they become detrimental to your facility's operations. These include:

- Acid Producing Bacteria -Monitor production of acids that attack metal surfaces, Turnaround: 8 days
- Denitrifying Bacteria- Track ammonia producers that attack copper alloys, Turnaround: 4 days
- Slime Forming Bacteria - Evaluate slime & sludge forming bacteria, Turnaround: 8 days
- Sulfate Reducing Bacteria - Monitor corrosion of metal surfaces, Turnaround: 8 days
- Nitrifying Bacteria - Detect corrosion on copper & steel, Turnaround: 5 days
- Iron Related Bacteria - Track iron deposits water passages plugging & metal deterioration, Turnaround: 8 days
- Algae - Detect algae that can absorb and inhibit biocides causing pitting of metal, Turnaround: 24 days
- Fluorescent Pseudomonads, monitor biofilm that may supply nutrients for Legionella, Turnaround: 8 days

This is a great time of year to test open recirculating systems, and chilled loops to get a "baseline' sample.

Since these number represent a "point in time" test it makes sense to test on a regular basis to be able to determine "trends" and to be able to identify a

potential corrosion issue that may be evolving. Therefore, a sampling strategy is important. If a potential MIC issue is found and acted upon then a follow up sample should be done shortly after remedial action is taken.

The importance of control of MIC cannot be stressed enough. Prior to "commissioning" of a hydronics system the system piping should be cleaned and sanitized. Care must be taken to "passivate" the system piping, and regular monitoring of chemical levels as well as bacterial levels should be prioritized.

Please let us know if you have questions about microbial corrosion screening, cooling tower start-up, Legionella testing or if you need help with a Legionella water management plan.

For over 25 years we've been the industry leader in Legionella validation testing and consulting. Click on the button below, call 502.893.6080 or email us today at est@estechlab.com TODAY!