

U.S. Fire Administration / National Fire Academy

*Coffee Break Training***Topic: Microbiologically Influenced Corrosion (MIC)**

Learning objective: The student shall be able to identify sources of microbiologically influenced corrosion in fire sprinkler systems.

The tiny hole in the rolled groove in this picture is a sprinkler fitter's nightmare: a small leak that potentially causes water damage to the building or contents where the sprinkler system is installed.

This leak was caused by *Microbiologically Influenced Corrosion (MIC)*, also known as *bio-corrosion*. It is the result of the metabolic action of microbial cells in contact with a metal surface, and can cause pitting, crevice corrosion, selective de-alloying, stress corrosion cracking, and deposit corrosion. Iron-oxidizing bacteria, such as *Gallionella*, *Sphaerotilus*, *Leptothrix*, and *Crenothrix*, are the leading sources of MIC.

The microorganisms get into the fire sprinkler piping system through the water supply. The organisms are aerobic (oxygen consuming) and develop clusters that live off the oxygen in the water or air in a dry-pipe system. Once these microbial clusters develop, anaerobic organisms continue to grow in the stagnant water without oxygen.

Periodic sprinkler system flow tests and other activations introduce fresh water—and fresh oxygen—that spurs the growth of the oxygen-dependent MIC organisms. This is one reason NFPA 13, *Installation of Automatic Sprinkler Systems*, does not require that an inspector's test outlet be located on a remote branch line in a wet-pipe sprinkler system: the fresh incoming water brings additional oxygen to the microbes.

MIC treatments depend on the specific types of microorganisms causing the corrosion, so there is no “one size fits all” solution. One plan, introducing chlorine into a system, may destroy some of the microorganisms, but it also may result in other types of corrosion. It's essential to obtain a sample of both the sprinkler piping and the water in the system to determine which microorganisms are causing the corrosion and select an appropriate treatment plan. Many sprinkler component manufacturers now produce “corrosion testing stations” to evaluate the water's condition.

For new sprinkler system installations, NFPA 13 requires that the property owner provide the sprinkler contractor an “Owner's Certificate” that includes an evaluation of the potential for MIC.

For additional information, refer to NFPA 13, *Installation of Automatic Sprinkler Systems*.

