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Is your Fire Sprinkler System protected?

Many facilities engineers don't give their fire sprinkler system a thought. They assume that their system is always available to protect them and will automatically activate if a fire occurs, quickly dousing the flames and limiting damage to their facility.

What they fail to realize is that problems may be lurking that could lead to system failure in an emergency situation, or cause leaks that damage ceilings, walls, furniture and equipment, and result in long-term mold and mildew problems.

Two recent incidents illustrate the potential severity of the situation. A sorority house in Indiana experienced a small fire, which was quickly extinguished by the sprinkler system. While the fire itself caused little harm, the house and its contents sustained major damage because the sprinkler water was loaded with a foul smelling black material that permanently stained everything it contacted. The black sludge was the result of microbiologically induced corrosion that occurred in the house's sprinkler system.

In another case, the sprinkler system at a major aerospace manufacturer developed a leak in the plant's mainframe production computer control room. The ensuing computer system outage shut down all manufacturing in the eastern half of the United States for six hours at a total cost to the company of 16 million dollars. Again, the cause of the leak was corrosion in the facility's fire sprinkler system.

Problems such as these are occurring with increasing frequency for two reasons. First, there are a greater number of sprinkler systems today as sprinkler protection is now mandatory in most commercial buildings. Second, as pressures increase to cut construction costs in new buildings, many sprinkler systems are constructed with lighter weight piping, some as low as schedule 5 (0.065 inch wall thickness). A corrosive condition in this weight pipe can quickly result in leaks.

Firewater sprinkler systems fall into one of two categories – wet pipe systems and dry pipe systems. In wet pipe systems, the risers, cross-mains and laterals are always filled with water. The stagnant conditions that exist in the system are conducive to both corrosion and the growth of micro-organisms, particularly anaerobes such as sulfate reducing bacteria (SRB). SRB produce acidic by-products that cause severe, highly localized corrosion that can cause rapid penetration of pipe walls, resulting in leaks. Water in the system is maintained under pressure, so leaks can spray over a large area, causing the types of problems mentioned earlier.

The piping in dry pipe systems does not contain water until a fire occurs. Pipes are maintained under constant air or nitrogen pressure. When a fire activates the system, the pressure is immediately relieved and the system rapidly fills with water from a tank or reservoir. It is not uncommon for these systems to lose pressure and fill with water. The system must then be drained before it can be reset. A residual of water is left in the piping, and recharging with air results in corrosion to the pipe surface. Pooling of water in the pipe laterals also provides an ideal

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environment for the growth of bacteria, which can begin producing biofilm.

This dual and inter-related problem of microbial growth and corrosion is all too common in firewater sprinkler systems. And unfortunately, facilities personnel are usually unaware the problem exists until the system develops a leak or an incident such as that at the sorority house occurs.

Fortunately, chemical treatment to prevent, or at least mitigate these problems, is available. The treatment approach is different from that typically used in recirculating closed loop systems. Standard corrosion inhibition programs such as molybdate or molybdate/nitrite require circulation of the water to maintain the protective film. Since the water in a sprinkler system is stagnant, maintenance of a molybdate or nitrite film is not possible, so a corrosion inhibition mechanism other than film formation is required. Some water treatment firms are using a unique volatile corrosion inhibitor (VCI) for protection of fire sprinkler systems. The VCI is injected into the sprinkler system where it disperses throughout the water and provides corrosion protection to all metal surfaces, even those not contacted by water. This allows protection of both wet and dry pipe systems.

Non-oxidizing biocides such as those used in cooling tower and closed loop applications are effective at controlling the growth of bacteria and other micro-organisms that infect sprinkler systems. Operators need to be aware, though, that only biocides approved by the US EPA for use in firewater sprinkler systems are acceptable. Use of a biocide not specifically approved by the US EPA for use in sprinkler systems is a violation of federal law.

Both the VCI and the biocide should be injected into the sprinkler system when the system is first filled. Chemical feed equipment required includes a flow meter mounted on the water fill line and a chemical injection pump that accepts external pulses from the flow meter to feed the chemicals in proportion to the volume of water added to the system. Existing systems that are filled with untreated water need to be drained and refilled with fresh water along with the VCI and biocide.

“An ounce of prevention is worth a pound of cure” is particularly apt when it comes to stopping corrosion in your sprinkler system. A few hundred dollars spent on firewater corrosion protection can prevent tens of thousands of dollars in damage caused by a leaking or failed sprinkler system.

Is your sprinkler system at risk?
Call your Chemtex representative today for help!