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STRAIGHTENING THE RECORD: DISCUSSION OF ERRORS IN ARTICLE BY JEFF KOCHELEK, FPC NOVEMBER 2016

1. Kochelek says “The goal of dry pipe nitrogen inerting (DPNI) in dry and preaction fire sprinkler systems is to first, purge the oxygen oxygen-rich air from the piping, and second, to eliminate the future introduction of oxygen gas into the system piping. The goal is NOT to prevent all forms of corrosion.”
    1.1. Note that, contrary to prior claims, he does not claim that NI removes oxygen from the water puddles, drops and from trapped water not drained from pipes installed prior to NFPA 13, 2016 edition. He does mention this fact in numbered items following paragraph 2 of his article.
    1.2. He also does not mention the fact that every time the fire protection systems (FPS) are tripped or tested new oxygenated water is introduced into the FPS piping and some oxygen partitions into the head space, requiring that NI be done again-a procedure which takes days to weeks to perform, is expensive and still leaves oxygenated water in portions of the FPS.
    1.3. He admits that the goal of NI is NOT to prevent all forms of corrosion. He does not tell us what forms are NOT prevented e.g., microbiologically influenced corrosion (MIC) which can occur under low or no oxygen conditions.
2. K says “Evidence from field sampling of failed fire sprinkler piping **indicates** that the vast majority of corrosion-related leaks are caused by oxygen, while bacteria in the fire sprinkler systems result in less the 5% of the leaks that occur.”

2.1. The is just an opinion as shown by “indicates”. No data are presented. How did they distinguish between “oxygen corrosion” and MIC? Very unscientific by any measure-even for someone who apparently does not understand MIC.

3. Under section on Bacteria in Fire Sprinkler Systems K claims that they analyze 300-500 pipe samples per year and several hundred MIC/deposit tests per year.

3.1. How many different locations were involved? This is important since we have analyzed hundreds of pipes from ONE location and, ONE location is not sufficient to draw any valid conclusions. We have analyzed many thousands of FPS samples over the last 20 years, and at locations across the North America, Latin America and South America and from wet, dry and preaction FPS, with many different water supplies, configurations, schedules, materials and metallurgies. We, and our clients, using our test kits have analyzed over 10,000 deposits from FPS to accurately determine whether MIC (which is, as originally defined by me, “any form of corrosion which is influenced by the presence and/or activities of microorganisms”) had a role in the corrosion or not.

3.2. Although I agree with his first two bullets in this section the third bullet is wrong. Instead of iron related bacteria the most common and essential element in MIC are the low nutrient bacteria (aka heterotrophic bacteria or general aerobic bacteria) which are the initial colonizers of MIC sites, aerobic, slime forming bacteria. The LNB provide bacteria such as acid producing, iron related, sulfate reducing and anaerobic bacteria an environment in which they can grow. All of these bacteria types are members of a microbial community which can be, and usually are, involved in MIC at some stage, a fact that he essentially admits in the fourth bullet.

3.3. In his fifth bullet he contends that “there is no **direct correlation** between the number of bacteria in a fire sprinkler system and number of leaks that the system experiences. He provides no data to support this statement. The fact is that the numbers and types of MIC bacteria in the source water and water from “hot spots” in the FPS are a good indicator of the **potential** for development of MIC.

3.4. In the sixth bullet he states that “there is a direct correlation between the **frequency of oxygen-rich air** introduction to a fire

sprinkler system and the number of leaks that occur in dry and preaction fire sprinkler systems." Again, he provides no data to support this statement. The fact is that microbes establish the sites on the metal which will pit. Oxygen is of course important in determining the **rates at which pitting will occur.** Many MIC microbes will function quite well at oxygen concentrations in the water near zero and some will use sulfate, nitrate, and ferric iron instead of oxygen.

3.5. In his seventh bullet he states that "nitrogen inerting will **always produce predictable results:** Cleaner piping by elimination of iron and zinc oxide by-product deposits. Fewer deposits **always means that there will be fewer bacteria.** No oxygen, no leaks-dramatic reduction in the number of corrosion related leaks." The statement that fewer deposits means fewer bacteria is an admission that the deposits contain bacteria-and therefore they certainly have roles in the deposit formation, and therefore, where under-deposit-pitting corrosion occurs. **It is an admission that the number of bacteria and the number of deposits and pits are positively correlated.**

4. Section on Monitoring Corrosion Activity

4.1. Kochelek, referencing Pope's article in September 2016 FPC magazine, states that "As a chemist, I would like to understand the protocol for measuring in-situ oxygen and iron." He obviously has never used our MICkits which give specific directions for measuring oxygen in water samples using methods identical to Winkler oxygen measurements in which the water is flowed into the sample tube and allowing the water to overflow thus preventing air from being entrained in the water sample, a procedure which a chemist should know how to do.

4.2. Soluble iron is measured using a test strip and the sample is also acidified and total iron is then measured. He is correct that "It is quite impossible to correlate iron measurements in a sample of water from the system to the level of corrosion in the system." The fact is that we only use iron measurements to indicate whether corrosion has occurred or is still occurring in the system.

4.3. We agree with much of Kochelek's discussion about coupons, which was largely contained in my September 2016 article in

FPC magazine, but disagree that “Pitting corrosion of the thin wall in the in-line detector will cause the detector to activate, and as such this device is highly representative of the worst case of corrosion in the system.“ Also “The in-line corrosion device is “real time” with immediate detection of elevated corrosion in the system.” The fact is that this device cannot accurately detect initiation of pitting corrosion as the thin steel’s metallurgy is certainly different from the sprinkler piping itself and therefore not representative of worst case situation in dry and preaction FPS, and by the time pitting corrosion has penetrated the thin steel, pitting will have initiated in other parts of the piping and cannot be reversed by NI.

5. Section Titled “The Use of Chemical Treatments”

5.1. Kochelek states that “chemical oxygen scavengers are not persistent within the piping system” etc. We have used a chemical (MICTREAT FPS) for 18 years in hundreds of wet, dry and preaction FPS without ANY cases of reoccurrence of pitting corrosion failures. That is because we proportionately and automatically deliver MICTREAT FPS to ALL waters entering the FPS using the MICtreat system, patented by Daniel H. Pope, in quantities sufficient to first kill microbes and then consume ALL of the oxygen in water in the piping and leave enough residual MICTREAT FPS to consume any oxygen subsequently entering the FPS. Residual MICTREAT FPS oxygen, microbes, and iron are ALL quickly measured by maintenance personnel to make sure that all microbes are dead, oxygen is absent, and there is enough MICTREAT FPS left to prevent microbial growth and ALL types of corrosion. We also recommend that nitrogen be used as supervisory gas instead of air, thus helping reduce the amount of oxygen capable of reacting with MICTREAT FPS.

5.2. It is also important to note that the amount of MICTREAT FPS in the FPS water has very low toxicity (you would have to drink many gallons of FPS water at one time to reach a level toxic to an adult man).

5.3. MICTREAT FPS is also compatible with ALL of the FPS components. We have never had any indication of incompatibility in several hundred installations.

5.4. It is also noted that contrary to Kochelek's assertion that "chemical products which claim to "kill microbes" must be registered with the federal government as a biocide for use in this particular industry. There are no registered biocides for the fire protection industry." THE FACT IS THAT MICTREAT FPS was registered with the EPA for use in FPS on 9/21/1999 AND BTI-PRODUCTS HAS EXCLUSIVE RIGHT TO DISTRIBUTE MICTREAT FPS FOR USE IN FPS!

5.5. It is obvious that Kochelek has not done his homework!