Time & Location: March 22, 2019 at 9:00 AM in Engineering 1 288
Title: Assessment of a Surface Water Supply for Source and Treated Distribution System Quality

This study focused on providing a source to tap assessment of surface water systems with respect to (i) the use of alternative biomonitoring tools, (ii) disinfection byproduct (DBP) formation and control, and (iii) corrosion control. In the first study component, two water systems were microbiologically evaluated using adenosine triphosphate (ATP) bioluminescence technology. It was determined that microbial ATP was useful as a surrogate for biomonitoring within a surface water system when paired with traditional methods. Although microbial activity differed between distribution systems that used either chloramine or chlorine disinfectant, in both cases flowrate and season affected microbial ATP values. In the second study component, total trihalomethanes (TTHM) and haloacetic acids (HAA5) DBP formation and disinfectant stability was investigated using a novel DBP control process. The method relied on a combination of sulfate, ultraviolet light irradiation, pH, and aeration unit operations. Results indicate respective decreases in 7-day TTHM and HAA5 formation potentials of 36% - 57% and 20% - 47% for the surface waters investigated. In the third component of this work, a corrosion study assessed the effect of changing disinfectant chemical cycles on the corrosion rates of common distribution system metals. When a chlorine based disinfection system transitioned between chlorine and chloramine, mild steel corrosion increased by 0.45 mils per year (mpy) under chloramine and returned to baseline corrosion rates under chlorine. However, when a chloramine based disinfection system transitioned between chloramine and chlorine, mild steel corrosion increased in tandem with total chlorine levels. Unlike the chlorine system, the mild steel corrosion rates did not return to baseline under chloramine after exposure to 5 mg/L of total chlorine. Surface water systems should consider the use of ATP as a surrogate for biomonitoring, consider the novel treatment process for DBP formation control, and consider corrosion control in disinfectant decision-making activities.

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Approved for distribution by Dr. Steven J. Duranceau, Committee Chair, on February 22, 2019.

The public is welcome to attend.