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Biofilm sloughing and CBP formation in a 12-km transport system carrying chlorinated saline secondary effluent

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ABSTRACT

A 12-km conveyance system has been placed in service for 10 years to transport treated municipal saline effluent which was not chlorinated. Now the effluent is being considered for chlorine disinfection to reduce *Escherichia coli* count to less than 1,000 cfu/100 mL. Since the system was not designed to carry the chlorinated flow, a simulator study has been conducted with a 68-m pipe loop (2.5″ ID) to assess the biofi lm growth and sloughing when the effluent is subjected to chlorination. In addition, the potential formations of THM and HAA 5 in the transport system are also assessed. Experimental results indicate that the level of biofilm growth in the pipe wall is mainly dictated by the organic strength of the effluent flow. For conveying the saline secondary effluent with a BOD of about 10 mg/L, the biofilm growth is approximately 160 μm. With chlorination of up to 5.0 mg/L, the biofilm growth and sloughing are not affected. As for CBP productions, 5.0 mg/L chlorination of the activated sludge effluent (with an operating sludge age of 5–12 days) does not result in any excessive CBP formations. The maximum THM and HAA 5 levels ever found in the chlorinated effluent are only 40 and 10 μg/L, respectively. This is because the added chlorine reacts instantaneously with effluent ammonia to form much less reactive combined residuals.

Keywords: Chlorination of saline secondary effluent; CBP formation; Biofilm growth and sloughing in force main

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