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Abstract Title: Comparing the effects of ozone dissolution systems on bromate formation and control in high bromide reuse waters: a pilot study

Abstract: Hampton Roads Sanitation District's (HRSD) Sustainable Water Initiative for Tomorrow (SWIFT) aims to replenish the Potomac Aquifer by augmenting 380 MLD of advanced treated wastewater effluent. This will help to alleviate issues with land subsidence and saltwater intrusion into the aquifer as well as reduce nutrient loadings into the Chesapeake Bay. At the heart of this system is ozone-biofiltration which is employed to degrade organics, destroy trace contaminants and provide disinfection credit.

In pilot testing, increased ozone exposures have been shown to improve biofilter performance. However, bromate formation becomes a limiting factor at higher ozone doses. Bromide concentrations above 400µg/L are present in the influent due to salt water infiltration and industrial sources, making bromate control vital to the success of the project. Pilot testing has shown that it is possible to effectively control bromate formation through the use of preformed monochloramine.

With these concerns about bromate formation, it is essential to understand the relationship between ozone exposure, monochloramine and bromate formation and how the method of ozone addition affects these variables. In fine bubble diffusion systems, there is considerable ozone exposure which is unaccounted for in the dissolution chamber for disinfection credit. Due to the high ozone demand of reuse waters, sidestream injection systems often require larger portions of the flow than in traditional drinking water treatment.

Ongoing testing seeks to optimize the ozone and monochloramine doses to maximize biofilter performance and disinfection credit while controlling bromate formation. Pilot testing will allow for the direct comparison between fine bubble diffusion and sidestream injection. Lessons learned from this testing will be implemented at the 3.8 MLD SWIFT Demonstration Facility and in the design of upcoming plants.