

## **AN ABSTRACT OF A THESIS**

# **A COMPARISON OF PRE-OXIDANTS AT THE COOKEVILLE WATER TREATMENT PLANT - A DISINFECTION BYPRODUCT STUDY**

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The Stage 2 Disinfectant Byproduct Rule requires systems to meet a running annual average of 80 µg/L for total trihalomethanes and 60 µg/L for haloacetic acids for each monitoring location in the distribution system. Once this rule is implemented, the City of Cookeville will exceed these limits during the summer quarter at one existing monitoring location with possible violations at sites to be determined by the Initial Distribution System Evaluation. In 2004, the City began a study to compare various pre-oxidants at their water treatment plant intake and the disinfection byproducts generated.

This study compared three pre-oxidants; chlorine, potassium permanganate, and hydrogen peroxide. These oxidants were injected at the raw water intake to determine the most effective oxidant prior to treatment at the Cookeville Water Plant. Trihalomethanes and haloacetic acids were the chlorinated byproducts compared in this study. Chlorine and potassium permanganate had similar readings for trihalomethanes, but chlorine oxidation at the raw water intake increased the haloacetic acid production across the plant and into the distribution system. The introduction of hydrogen peroxide showed a reduction in the chlorinated byproduct formation in the distribution system three quarters of the year. The 2006 summer quarter showed an increase in chlorinated byproduct formation due to algal growth in the clarifiers requiring chlorine addition at the rapid mix basin pre-clarification.

The various chemicals used as pre-oxidants, plant operation, disinfection byproducts generated, and lessons learned are discussed. The pre-oxidation study is ongoing as the City of Cookeville continues to explore new methods for reducing disinfection byproducts in the distribution system. The findings to this point show that annual running averages below the 80/60 µg/L required by the Stage 2 ByProducts Rule can be met when potassium permanganate, chlorine, or hydrogen peroxide is used as a pre-oxidant.