

AN ABSTRACT OF A THESIS

EVALUATION OF THE PULSEPOWER™ SYSTEM IN THE DEGRADATION  
OF SUWANNEE RIVER FULVIC ACID

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The PulsePower™ System from Scientific Utilization, Inc., Huntsville, Alabama, is a unique pilot-scale pulsed discharge system that operates at a peak voltage of 15kV, with rise times of approximately 2.5μsec. The system was used to treat Suwannee River Fulvic Acid (SFA), a model humic substance, used as a trihalomethane formation potential (THMFP) precursor material. Buffer and pH effects on the THMFP were found to be insignificant ( $\alpha = 0.05$ ), which proved that comparisons can be made for studies using SFA with either a phosphate or borate buffer (pH 7 - 9) and a seven-day chlorination period at 25°C. THMFP was used as an analytical technique to monitor degradation of 5 mg/L DOC SFA with the PulsePower™ System at each of the four operational configurations for pulse energy and frequency (0.15J at 60 Hz, 0.15J at 120Hz, 0.4J at 60Hz, and 0.4J at 120Hz). At the settings of 0.15J at 120Hz, the decrease in THMFP for the first 30 minutes of arc time was 74.8 μg CHCl<sub>3</sub>/L (an 11% decrease in the original THMFP) and for the subsequent 30 minutes 7.47 μg CHCl<sub>3</sub>/L (a 1% decrease). Other settings created decreased THMFP after 60 minutes of test time, however, the setting of 0.15J at 120 Hz was the only configuration that exhibited continuous decrease in THMFP throughout the test time. Excitation-emission fluorescence supported the THMFP data showing a decrease in fluorescing compounds with treatment. However, DOC and UVA<sub>254</sub> data did not show corresponding decreases. The PulsePower™ system appeared to change the form of the SFA to compounds that exhibited changes in chlorine reactivity and lack of fluorescence, but the organics were not completely mineralized to carbon dioxide.