In this research, five different coagulants were evaluated to determine their effectiveness at removing turbidity, color and dissolved organic carbon (DOC) from surface water using bench-scale jar tests that simulated conventional coagulation, sedimentation, and filtration (CSF) processes. Iron-based coagulants (ferric chloride and ferric sulfate) and aluminum-based coagulants (aluminum sulfate, polyaluminum chloride and aluminum chlorohydrate) were used to treat a highly organic surface water supply (DOC ranging between 10 and 30 mg/L), known as the Cow Pen Slough, located within central Sarasota County, Florida. Isopleths depicting DOC and color removal efficiencies as a function of both pH and coagulant dose were developed and evaluated. Ferric chloride and ACH were observed to obtain the highest DOC (85% and 70%, respectively) and color (98% and 97%, respectively) removals at the lowest dose concentrations (120mg/L and 100mg/L, respectively). Ferric sulfate was effective at DOC removal but required a higher concentration of coagulant and was the least effective coagulant at removing color. The traditional iron-based coagulants and alum had low turbidity removals and they were often observed to add turbidity to the water. PACl and ACH had similar percent removals for color and turbidity achieving consistent percent removals of 95% and 45%, respectively, but PACl was less effective than ACH at removing organics. Sludge settling curves and dose-sludge production ratios were determined at optimum DOC removal conditions for each coagulant. Ferric chloride was found to have the highest sludge settling rate but also produced the largest sludge quantities.