Hydrogen sulfide is commonly found in many Florida potable groundwater supplies. Removing sulfur species, particularly hydrogen sulfide, is important because if left untreated, sulfide can impact finished water quality, corrosivity, create undesirable taste and odor, and oxidize to form visible turbidity and color. This document presents the results of a study designed to investigate the removal efficiencies of a variety of tray aerators in Central Florida in order to develop predictive mathematical models that could be used to predict tray effectiveness for sulfide removal. A literature review was performed that indicated there was limited information regarding the removal of H2S using conventional tray aerators. Unlike with tray aerators, there was more information available regarding the usefulness of other technologies in the removal of H2S. The literature indicated that there was a need for this type of work to be accomplished.

Experimental data on tray aerators were collected from the University of Central Florida, Orlando in Orange county, Lake Hamilton in Polk county and Sarasota-Verna in Sarasota county. The total sulfide concentrations passing through the trays were determined using a standard iodometric method. Also, other water quality parameters collected included dissolved oxygen, pH, temperature, conductivity, turbidity, alkalinity, hardness, total dissolved solids, and total suspended solids; these samples were collected and determined either in the field or at the UCF laboratory.

A first order empirical model and a stripping vapor phase model were evaluated to predict sulfide removal in tray aerators. The empirical model provided a better result when compared with the stripping vapor phase model. From the empirical model, it was shown that as pH and flow increase, sulfide removal was negatively impacted; however, as surface area and temperature increased, sulfide removal also increased. In either case, the combined parameter of pH, flow rate, temperature and area provided an empirical constant that could be used to predict sulfide removal in tray aerators as a first order process simply by measuring sulfide content in the raw groundwater supply and knowing the number of tray levels available for treatment.