

AN ABSTRACT OF A THESIS

DETERMINATION OF A WATER QUALITY MARKER REFLECTING THE EFFECTIVENESS OF THE SEWANEE UTILITY DISTRICTS LAND APPLICATION SYSTEM

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The effectiveness of the Sewanee Utility Districts (SUD) land application system in treating wastewater was determined through a period of one year. Chemical characterization of water samples collected at delineated locations in the land application site and from the effluent in the final lagoon cell was studied during both dry weather and storm events. Statistical analysis was used to determine parameter(s) in the lagoon effluent applied to land that are significantly different from water quality parameters in surface waters entering and leaving the irrigation site. A preliminary irrigation schedule was determined using water balance calculation. Trapezoidal and elliptical models were developed to predict changes in the depth of the lagoons with the corresponding volume change. The study recommended monitoring nitrogen and phosphorus levels to maintain N:P ratios below 16. Suggestions were made to limit the nitrate-nitrogen levels below 10 mg-N/L. The lagoon cell C, dike wall required investigation in lieu of the high iron concentration observed in Effluent stream 2 (ESTM2). The trapezoidal model gave closer estimates of the volume change for the lagoons in the SUD land application system. Water balance calculations showed that the lagoons could provide storage of one month if operated at the normal operating level of 2.29 m (7.5 ft) and one month and ten days if the maximum depth is 2.59 m (8.5 ft).