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PROCESS ANALYSIS OF NUTRIENT AND NON-NUTRIENT WATER RESOURCE RECOVERY FACILITIES (WRRFS)

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Abstract

The main objective of this study was to assess the effluent quality from conventional biological wastewater treatment processes compared to the effluent quality from biological nutrient removal (BNR) and chemical nutrient removal (CNR) systems operating throughout the State of Georgia. Statistical analyses were performed to determine if there were significant differences in process performances between nutrient removal facilities (NRFs) and non-nutrient removal facilities (NNRFs). Correlations between maximum and annual average effluent concentrations for ammonia and total phosphorus (TP) were determined. All facilities were evaluated based on four effluent water quality parameters that included biochemical oxygen demand (BOD), total suspended solids (TSS), ammonia nitrogen (NH_3-N), and total phosphorus (TP). Effluent quality data from each facility and for each parameter was ranked from the lowest effluent concentration to the highest effluent concentration. Statistical analyses indicated that both the BNR and CNR nutrient removal facilities achieved higher levels of treatment than the non-nutrient removal facilities. A strong correlation ($R^2 = 0.86$) between maximum month effluent TP concentration and annual average effluent TP concentration was observed. A moderate correlation ($R^2 = 0.64$) was observed between the maximum month effluent ammonia concentration and the annual average effluent ammonia concentration. On a seasonal basis (winter, spring, fall and summer), the statistical analyses showed that the effluent quality from the NRFs was always better than that from the NNRFs.

Key words: biological nutrient removal, chemical nutrient removal, statistical analyses, WRRFs

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