Pattamaporn Nindee 2009: Treatment of Partially Stabilized Leachate in Two-Stage Membrane Bioreactor. Master of Engineering (Environmental Engineering), Major Field: Environmental Engineering, Department of Environmental Engineering. Thesis Advisor: Associate Professor Chart Chiemchaisri, D.Eng. 118 pages.

This research was conducted to investigate the possibility in using two-stage membrane bioreactor treating partially stabilized landfill leachate by studying its performance in terms of organic and nitrogen removal, sludge characteristics and microbial population. The results indicated that the start-up of pilot-scale at hydraulic retention time (HRT) of 24 hours for 75 days in aerobic tank, average BOD_5, COD, TKN and TP removals were 99.43, 61.92, 69.87 and 39.21%, respectively. The operation of two-stage membrane bioreactor having 12 hours HRT in aerobic tank plus 15 hours HRT in anoxic tank for 120 days at organic loading rate of 1.04-2.53 $kgBOD/m^3$ gave average BOD_5, COD, TKN and TP removals of 99.56, 64.14, 88.29 and 48.29%, respectively. Nitrification and denitrification efficiencies were 66.7 and 61.1%. When organic loading was increased to 4.4-7.2 $kgBOD/m^3$, average BOD_5, COD, TKN and TP removals were 99.82, 71.89, 82.75 and 43.79% during 79 days of operation respectively. Nitrification and denitrification efficiencies were 58.3 and 58.13%, which was lower than previous operating condition because of an increase in influent TKN concentration from 518 mg/l to 1,675 mg/l. The biomass in anoxic tank increased gradually from the daily recirculation of biomass from aerobic tank. The microorganisms produced more Extra-cellular Polymeric Substances (EPS) when organic loading to the system increased. The characterization of bacterial population in two-stage membrane bioreactor showed similar content in anoxic tank and aerobic tank. The dominated nitrogen transforming bacteria in anoxic and aerobic tank were ammonia oxidizing ß Proteobacteria. Furthermore, anammox bacteria were found in both tanks.

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