

Rawiwan Rodpho 2015: Nitrogen Phosphorus and Organic Matter Removal Efficiencies Study and Greenhouse Effect Gases Measurement at the Phuket Municipal Wastewater Treatment Plant, Phuket Province. Master of Engineering (Environmental Engineering), Major Field: Environmental Engineering, Department of Environmental Engineering. Thesis Advisor: Associate Professor Pongsak Noopan, Ph.D. 157 pages.

The objectives of this research were studied about nitrogen, phosphorus, and organic matter removal efficiencies, nitrogen removal efficiency by nitrifying microorganisms at various temperatures and greenhouse gases emission from oxidation ditch system at Phuket Municipal Wastewater Treatment Plant. First part experimental sections consisted of analyzing characteristics of wastewater include COD, SCOD, TKN, ammonia, nitrite, nitrate TP, and BOD for operating performance efficiency determination, studying the rate of decomposition of organic matter by biological treatment process and the effects of aeration which are efficient to overall operating performance as the first part. Second, the nitrogen removal rate by nitrifying microorganisms was studied at varied temperature 10, 20 and 30 °C. The third part amount of nitrous oxide, carbon dioxide and methane emission from the plant was studied.

From the results, 91.32% of COD, 73.85% of SCOD, 93.79% of BOD, 76.94 %of TKN, 36.76% of ammonium and 77.85% of TP were removed and shown as the removal efficiency. The first-order reaction coefficients of organic matter decomposition at 20 °C were 0.04-0.25 per day at influent and 0.02-0.11 per day at effluent respectively. A 1030 m<sup>2</sup> of anoxic zone and a 190 m<sup>2</sup> of aerobic zone were consisted of 1220 m<sup>2</sup> total aeration tank area. The nitrogen removal rates by nitrifying microorganisms at 10, 20 and 30 °C were about 0.15, 0.23 and 0.41 mg N/day-mg MLVSS, respectively. The average amount of nitrous oxide, carbon dioxide and methane emissions from anoxic zone were  $8.03 \times 10^{-3}$ , 89.75 and 89.37 kg/ton wastewater respectively. In aerobic zone, the average amount of N<sub>2</sub>O, CO<sub>2</sub>, and CH<sub>4</sub> emissions were  $0.93 \times 10^{-3}$ , 88.56 and 5.28 kg/ton wastewater, respectively

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Thesis Advisor's signature