

Thanawat Jinjaruk 2014: Water Balance in Oxidation Pond System at The King's Royally Initiated Laem Phak Bia Environmental Research and Development Project, Phetchaburi Province. Master of Engineering (Water Resources Engineering), Major Field: Water Resources Engineering, Department of Water Resources Engineering. Thesis Advisor: Associate Professor Kobkiat Pongput, Ph.D. 186 pages.

The purposes of this research are to determine water balance in oxidation pond system (OPS) at The King's Royally Initiated Laem Phak Bia Environmental Research and Development Project, to find the correlations of evaporation rate between climatic station (CS) and 5 oxidation ponds (5 OPs) arranged by degree of degradation by nature process, and to analyze the effect of wastewater quality toward evaporation rate. The study was conducted in rainy season started from June 5 to November 27, 2013, totaling 176 days. The data were collected and calculated daily. The result of the study showed that the total retention time of OPS was 65.4 days which were 5.2, 12.4, 15.9, 15.0 and 16.9 days for sedimentation pond (SP), 1, 2, and 3 oxidation ponds (1-OP, 2-OP and 3-OP) and polishing pond (PP), respectively. There were five factors effecting the water balance; the amount of wastewater input ( $1,125,901.69 \text{ m}^3$ ), the rain water ( $171,018.92 \text{ m}^3$ ), the wastewater output ( $1,151,076.48 \text{ m}^3$ ), the evaporation ( $141,495.59 \text{ m}^3$ ), and the seepage ( $4,741.44 \text{ m}^3$ ). The wastewater was taken into OPS at SP and discharged at PP. The average of evaporation rate of SP, 1-OP, 2-OP, 3-OP, PP and CS were 5.79, 5.39, 5.33, 5.53, 5.39 and 5.04 mm, respectively. The evaporation rate of all 5 OPs were calculated by using linear regression equation from the evaporation rate at CS at the accuracy not less than 55% and 70% for 3-OP and other respectively. The study also showed that the water quality has an effect on evaporation rate. The increase of evaporation rate of wastewater was affected by the increase of solar heat energy absorption, caused by dark color from ferric sulfide (FeS) and suspended solid. Moreover, the wastewater also received heat energy from the degradation process of microorganism. The surfactant helped the wastewater use less energy to evaporate. However, if the salinity increases, the vapor pressure deficit of water at surface will decrease, resulting the evaporation rate decreases.

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Thesis Advisor's signature