

Reverse Osmosis Water Treatment Plant Monitoring and Performance Evaluation

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Abstract

Reverse Osmosis water treatment technology is considered one of the most all-round effective ways of eliminating water contaminants. Reverse Osmosis filters nearly all contaminants and is significantly safer and better for the environment. Therefore, the purpose of this project is to evaluate the performance of the Reverse Osmosis in water treatment processes. The objectives of this project include evaluating the performance of RO Plant at UBU Food Pilot Plant, Ubon Ratchathani University, Thailand while determining the quality of product water as well. With no intervention incurred during the operation process of RO Plant, performance parameters like rejection, salt passage, recovery, pressure differentials, and water flux has been analyzed. Analysis of product water quality has been assessed via reliable instruments and experimentation. The energy consumed to produce product water and its cost analysis is also being determined in this project. Within the study period of four months, the performance of the RO plant comprises salt rejection = 97.22%, salt passage = 2.79%, recovery = 47.33%, pressure differential = 4.36 psi, and permeate flux = 14.52 GFD. The product water quality parameters are found to be within the range of WHO Drinking Water Quality Standards; pH = 6.5, TDS = 1.45 ppm, EC = 2.9 $\mu\text{S}/\text{cm}$, hardness = 0 mg/L as CaCO_3 , and coliforms (TCB, FCB, and E. coli) are not detected. It is found that the performance of the plant determines the quality of product water. The plant consumes 10.86 kWh of energy per day which cost approximately ฿62.70. It costs roughly ฿23.40 to generate 1 m³ of water.