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Optimization of wastewater desalination

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ABSTRACT

The shortage of water in Israel and concern about the quality of groundwater resources have led to awareness that a national wastewater reclamation program should be developed. Such a program could cover a major portion of the agricultural water demand and also include water reuse for other applications such as aquifer recharge and industrial uses. The implementation of Integrated Membrane System (IMS) contributes to the success of treating wastewater effluents. The system comprises UF pretreatment for RO followed by NF desalination. Evaluation of the performance of UF and RO membranes was conducted by monitoring the effect o multiple variables including pretreatment, feed quality and operating flux. Trials were conducted to determine the optimum operating conditions for the entire system. The results achieved within this study indicate significant cost benefits in the range of approximately 20% for medium and large scale wastewater desalination systems. This paper presents the research activity over the last 3 years in advanced tertiary treatment: desalination of secondary effluents after activated sludge process by IMS consisting of immersed UF technologies and RO. Large demonstration-sized pilot plants, located at the biggest WWTP in Israel, the Shafdan, were used for the research. Results of the evaluation and optimization of UF technology are conveyed. Data obtained from the operation of the RO membrane system and an RO/NF hybrid system at high fluxes and high (up to 90%) recovery ratios are also detailed.

Keywords: Ultrafiltration; Secondary effluent; Desalination; Antiscalant; Biocide; Biofouling

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