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Innovative procedure of chemical cleaning for RO membranes to reduce the energy consumption in the operation of a BWRO plant

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A B S T R A C T

This study presents an innovative chemical cleaning procedure for reverse osmosis (RO) membranes designed to reduce operating pressure and energy consumption in a brackish water reverse osmosis (BWRO) plant. Our objective was to develop a method to effectively combat the fouling caused by the feedwater on the first-stage membranes. We analysed over 17,000 h of operational data from a BWRO plant that features a well intake, a transfer pump, antiscalant dosing, and a conventional physical pretreatment system with sand and cartridge filters. The plant's two-stage RO system consists of 40 pressure vessels in the first stage and 20 in the second, each containing six BWRO elements. After 12,500 h of operation, significant fouling occurred on the first-stage membranes. A basic clean-in-place (CIP) procedure was conducted using sodium hydroxide (NaOH) at a pH of 11–12 to restore the permeate flow rate. This research demonstrates how a refined cleaning protocol can significantly improve the performance and energy efficiency of desalination processes.

Keywords: Energy use; Reverse osmosis membranes; Brackish water; Chemical cleaning

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