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Priority pollutants and other micropollutants removal in an MBR-RO wastewater treatment system

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ABSTRACT

A small footprint wastewater treatment plant that consists of a membrane bioreactor coupled with a reverse osmosis unit (MBR-RO) has been placed and set in operation for 24 months in the R&D department of the Athens Water Supply and Sewage Company (EYDAP) in order to evaluate the quality of the treated effluent and to explore the feasibility of reuse of the reclaimed water in compliance with the Greek legislation. A sustainable technology called sewer mining (SM) has been applied, which abstracts raw wastewater directly from the sewerage network, treats it on site, and provides water at the point of demand. Monitoring of system's performance was achieved through a series of lab analyses and on-line measurements. In addition to the microbiological and conventional parameters, final effluent was also analyzed for heavy metals, priority pollutants, and other micropollutants in order to examine compliance with the threshold values set in Greece for wastewater reuse of treatment plants with a treatment capacity greater than 100,000 population equivalents. Results showed that the MBR-RO technology achieves a high-quality effluent, suitable for many reuse purposes. The MBR unit managed a substantial reduction of all heavy metals, while the RO unit resulted in heavy metals removal to concentrations below the detection limit. Regarding priority pollutants following MBR treatment, all but chloroform were under the detection limit. The research confirmed the need for RO as a posttreatment level in the case of saline wastewater and/or very strict organic micropollutants threshold values.

Keywords: Sewer mining; Membrane bioreactor; Reverse osmosis; Priority pollutants; Heavy metals; Micropollutants; Water reuse

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