



## Fouling minimised reclamation of secondary effluents with reverse osmosis (ReSeRO)

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### ABSTRACT

A group of researchers from Israel and Germany investigates fouling minimized reclamation of secondary effluent of municipal waste waters for unrestricted irrigation. Countries with increasing water scarcity including Israel are forced to use secondary or tertiary effluents for irrigation. The quality of the effluents can be increased to the levels of drinking water with multistage membrane process where low pressure membranes, mostly ultrafiltration (UF) are used as a pretreatment to reverse osmosis (RO). The minimisation of the organic and biofouling on UF and RO membranes is achieved by different pretreatments including biofiltration, coagulation and adsorption on powdered activated carbon. The pretreatment options are considered separately and in various combinations. The reduced fouling will also be achieved by modification of the membrane surface by the manufacturer. This study incorporates field and lab experiments, the latter are performed for a better understanding of biofouling-induced increased scaling in RO membranes. In order to enable the study of RO foulants on the membrane sheets, RO test-cells were developed for detailed analysis of fouled RO membranes by autopsy. The relevance of the lab-observed trends to the treatment of the secondary effluents of Sede Teiman wastewater treatment plant will be verified. Studies of flow conditions and the influence of flow conditions on transport and fouling layer formation are performed using computational fluid dynamics (CFD). Further modelling will be done on the biological elimination of organic substrates within biofilters.

*Keywords:* Biofiltration; Coagulation; Desalination; Fouling; Membrane processes; Reverse osmosis; Scaling; Ultrafiltration

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