



## Assessment of fouling of an RO process dedicated to indirect potable reuse

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Received 6 July 2011; Accepted 9 October 2011

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### ABSTRACT

Autopsies of three elements of a three-stages reverse osmosis process (lead, central and tail elements of respectively Stage 1, 2 and 3) treating microfiltered wastewater effluent were performed to quantify the propensity of each stage to foul. As expected, results showed fouling on Stages 1 and 2 to be predominantly biofouling whilst Stage 3, the most heavily fouled, was subject to most pronounced scaling, predominantly by calcium phosphate. Chloramine dosing in the RO feed water appeared largely ineffective for membrane biofouling mitigation due to its low rejection by the RO membrane leading to a very low residual in the RO retentate stream. Five antiscalants (three commercialised and two under development) were tested at pilot scale and their efficiency for scaling mitigation compared. Results showed wide variations in effectiveness, with the novel reagents showing the most promising results. However, none of the antiscalants tested succeeded in completely suppressing scaling without the addition of sulphuric acid. A cost analysis showed the operating cost to be most sensitive to pH adjustment, with reduced acid dosing requirement providing a significant cost benefit.

*Keywords:* Membrane autopsy; Reverse osmosis; Antiscalant; Calcium phosphate; Wastewater reuse

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