

Rectification methods for the fouling of ultrafiltration hollow-fibre membranes as a result of excessive soluble iron

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Received 27 August 2010; Accepted in revised form 1 March 2011

ABSTRACT

The aim of this study is to analyse process design parameters relating to a membrane bioreactor (MBR) membrane and chemical dosing systems as well as the characteristics of membrane foulant so as to identify a remedy for implementation. A qualitative research undertaken included electron microscopy analysis of the fouled membranes through a membrane autopsy which showed major inorganic deposits to the membrane surface, mainly comprising of iron. As it currently remains, the membrane system utilises citric acid for chemical in-place cleaning of the membranes. Analysis of results identifies the impact of membrane foulant to the operational performance of the treatment works and the impairment to effluent quality discharged to local waterways. Furthermore, an assessment into economic impacts is expected to show significant opportunities for improvements to operating costs as a direct result of cleaner membranes returning transmembrane pressures to normal levels during the permeate production cycle. The study also proposes optimisation strategies of the current cleaning process that is adequate for the level of ferric chloride dosed for phosphorous removal and odour control. Consideration is given to two types of strategies for rectification.

Keywords: Flocculation; Fouling; Membrane bioreactor; Ultrafiltration; Wastewater

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