

Autopsy of RO desalination membranes Part 1. Microbial characterization of foulants

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ABSTRACT

Comprehensive autopsies of RO membrane elements from a seawater desalination plant were performed before and after chemical cleaning. The RO membrane elements (FILMTEC, SW30HR LE-400 8") selected for the autopsy studies have been in service for nearly 2 years and were located in front position of a pressure vessel from the first pass of one of the RO units. Process performances have been quite stable for the whole period of operation. Before and after chemical cleaning both membrane elements showed a visible deposit on the membrane surfaces with wet matter of 27 g/m² (before) and 11 g/m² (after) cleaning. By ICP-OES analyses before cleaning, a high content of iron and manganese was found in the deposit. After chemical cleaning, most of the parameters remained stable except the manganese content which was not detected any more. The autopsies underlined the presence of a biofilm even if no obvious loss of membrane performances was observed. The high content of manganese and iron in combination with the microscopic image of the layer indicated the presence of manganese and iron-oxidising bacteria together with their metabolites. Chemical cleaning seems to have a limited impact on this type of biofouling despite the improvement observed on pressure drops.

Keywords: Desalination; Membrane fouling; Iron-oxidising bacteria; Manganese-oxidising bacteria

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