



Scaling potential calculations using different methods Case study: Klazienaveen UF/RO plant

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ABSTRACT

In this paper, the scaling potential of various sparingly soluble compounds was calculated in the concentrate of a full scale reverse osmosis (RO) plant, using various methods and commercially available software programs. The critical compounds calculated were CaCO_3 , CaSO_4 , BaSO_4 , SrSO_4 , and SiO_2 . Since July 2000, the Drenthe Water Supply Company (WMD) supplies high quality water to the Activated Carbon Manufacturing plant (Norit) in Klazienaveen. The production capacity is between 230,000 and 455,000 m³/y. The water source is canal water and shows high variations in water quality. To produce this capacity and to meet the water quality standard required for industrial use (boiler feed water), high chemical dosages are applied. Antiscalant is one of the chemicals currently dosed in order to avoid scaling and ensure smooth operation of the RO system. All the software programs employed (ROSA, IMS Design Hydranautics, 4Aqua care, and Phreeqc) and manual calculations with the ASTM method, showed different scaling potentials for the same feed water. All methods employed suggested that the RO concentrate was under-saturated with respect to CaSO_4 , SrSO_4 , and SiO_2 . In addition, BaSO_4 was not expected to occur based on Boerlage's scaling risk limits. In winter periods no antiscalant was needed since the pH was always below the critical pH limit of 7.0. In the summer period, the temperature increased to 25°C, and the possibility of CaCO_3 scaling existed, since the critical pH of 6.5 was exceeded. However, based on the results of scaling calculations made in this study, the antiscalant can be stopped and scaling is not expected to occur, if the pH feed is decreased to 6.5 or lower.

Keywords: Scaling; Antiscalant

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