



Scale control in multistage flash (MSF) desalination plants – lessons learnt

Osman A. Hamed

Desalination Technologies Research Institute (DTRI), Saline Water Conversion Corporation (SWCC), P.O. Box 8328, Al-Jubail 31951, Saudi Arabia, emails: oahamed@yahoo.com, rdc@swcc.gov.sa

Received 26 February 2017; Accepted 23 June 2017

ABSTRACT

Adoption of successful methods for scale control is one of the main factors that contributed to the wide application of the multistage flash (MSF) desalination processes in the Gulf Cooperation Council (GCC) regions. Formation of scale is mainly caused by crystallization of calcium carbonate and magnesium hydroxide (alkaline scale) and calcium sulfate (non-alkaline scale). In this paper, the evolution of alkaline scale control in MSF desalination plants during the last four decades is described and reviewed. The unique experience gained by the Saline Water Conversion Corporation (SWCC) of Saudi Arabia in controlling alkaline scale formation is presented. The extensive optimization tests, which have been carried out by SWCC and materialized in significant reduction of antiscalant dose rates are highlighted. Procedures employed for online sponge ball cleaning are discussed. Various corrective measures that are normally adopted to mitigate the consequences of malfunctions of antiscalant dosing or the online ball cleaning systems are reviewed. Prospects of controlling non-alkaline scale and operating MSF desalination plants at high top brine temperature (TBT) using nanofiltration pretreatment are discussed. Increase of TBT shall result in the increase of water production and reduction of specific energy consumption.

Keywords: MSF; Scale control; Alkaline scale; Ball cleaning; Nanofiltration pretreatment
