Desalination and Water Treatment
www.deswater.com
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doi: 10/5004/dwt.2012.2467

Taylor & Francis
Taylor & Francis Group

42 (2012) 117–124
April

Operating conditions and membrane selection for the removal of conventional and emerging pollutants from spring water using nanofiltration technology: the Tula Valley case

Fabián Neira Ruíz*, Arnold Arcos Arévalo, Juan Carlos Durán Álvarez, Blanca Jiménez Cisneros

Engineering Institute, National University of Mexico, PO BOX 70472, Ciudad Universitaria, zip code 04510, Coyoacán, Mexico, D.F. Tel. +52 5623.3675; Fax: 52 5623.3600 ext. 8694; emails: fneirar@iingen.unam.mx, aarcosa@iingen.unam.mx

Received 20 October 2010; Accepted 15 June 2011

ABSTRACT

The aquifer of the Tula Valley in Mexico is recharged by the infiltration of wastewater used for agricultural irrigation. This aquifer is considered to be a possible source of water for Mexico City, and although, in general, the water is good quality it still contains hardness and specific emerging pollutants. This research aims to identify a suitable treatment process based on membrane nanofiltration as it is a proven technology. Four nanofiltration membranes were compared using the critical flux concept in order to select the two that produced the largest amount of permeate. Membrane fouling was assessed by investigating the deposition of calcium using SEM images. To control hardness scaling, pretreatment with 150% of lime was employed. Finally, one membrane was selected based on its capability to remove carbamazepine, bisphenol A, triclosan, butilbenzylphthalate, and 4-nonylphenol. The selected membrane was operated at 800 kPa, producing 87.30 l m^{-2} h^{-1}.

Keywords: Critical flux; Drinking water; Fouling; Nanofiltration; Unintentional water reuse; Emerging pollutants

*Corresponding author.