

S1.4.2 Ultrafiltration and Reverse Osmosis Testing on Tertiary Effluent from the San Diego North City Water Reclamation Plant

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Ultrafiltration (UF) membranes have already gained worldwide acceptance in the treatment of drinking water for their removal of chlorine resistant pathogens such as cryptosporidium. Tertiary treatment with UF has been established, although with a lower level of knowledge and number of installations. Likewise, Reverse Osmosis (RO) is gaining strong traction as a method of reliably removing dissolved solids from UF tertiary effluent, while keeping fouling in check with the use of monochloramine. The City of San Diego has incorporated Ultrafiltration (UF) / Microfiltration (MF) and Reverse Osmosis (RO) membranes into their 1.0 million gallons per day (MGD) Water Purification Demonstration Project where municipal tertiary effluent from the North City Water Reclamation Plant is treated by UF/MF followed by Reverse Osmosis (RO), UV and an Advanced Oxidation process. The demonstration project was successful in obtaining conceptual approval from the state Division of Drinking Water for a 15 MGD facility. The City is now evaluating full-scale facilities (83 MGD total combined capacity) currently envisioned as Indirect Potable Reuse (IPR), but is also evaluating the feasibility of Direct Potable Reuse (DPR).

This paper will discuss the performance of hollow fiber UF/MF membrane modules in treating tertiary effluent, and the subsequent performance of the downstream RO membranes. Parameters critical to defining the performance of a hollow fiber membrane system will be discussed such as Trans-Membrane Pressure (TMP), flux and temperature corrected permeability. Membrane integrity will also be discussed with analysis of feed and filtrate turbidity along with the results of the daily Pressure Decay Test (PDT), along with details of CIP cleanings for the UF. The influence of pretreatment on UF performance at the North City Plant will be presented. Lastly, the RO system performance discussion will focus on the use of monochloramine in the feed water to the membranes, and the resulting affects in regard to salt passage and seal degradation.

As the demand for potable water grows in urban areas, potable reuse is an appealing option for providing an additional purified sustainable source to local water supplies. Understanding the operation and design options available of a UF/RO combination system in this application will assist Utilities in their choice of unit operations for planning an advanced water purification facility.