Restoration of “dead” clay fouled membranes

Umar Farooq*, Sarwar Sheikh

Water Regime (PVT) Ltd, C-2/R-3. Floor, Al-Burhan Circle, Block E, North Nazimabad, Karachi
Tel. +92 21 36635075; Fax: +92 21 36635078/92 300 7029866; email: engr_umarfarooq@yahoo.com

Received 14 June 2012; Accepted 18 July 2012

ABSTRACT
Without doubt, the membrane is the key component of a Reverse Osmosis (RO) system, but the pretreatment system is often the most important contributor to the smooth and efficient operation of a membrane plant. This is especially true when treating challenging source waters such as highly turbid surface waters from open canals, rivers, and lakes. These are often contaminated with a variety of organics that have complex and variable chemistries and can carry large loads of suspended solids. Amongst these are the clay minerals, (alumino-silicates), derived from the weathering of rocks and the entrainment of soils, which create a particularly difficult fouling. Over 100 RO plants in the Karachi area are affected by this type of fouling which is characterized by high 1st stage differential pressure (ΔP) and loss of flux. The clay forms a layer on the membrane surface which is impervious to water and so feed pressures are increased to maintain permeate flow, resulting in increased energy costs due to higher consumption of electricity. Permeate quality is also affected by impregnated clay interfering with the salt rejection properties of the membrane. This article presents the results of cleaning experiments conducted on completely fouled membranes and to all intents ‘Dead’ membranes from a system treating such canal water. Cleanings were performed with conventional commodity chemicals, a series of proprietary products, and finally with a specialist product (Genesol-703) specifically designed for the removal of clay fouling. In conducting the experiments, a specific method of application was derived which gives extremely good results.

Keywords: Membranes; Clay; Fouling; Restoration; Flux; Cleaning

*Corresponding author.

Presented at the International Conference on Desalination for the Environment, Clean Water and Energy, European Desalination Society, 23–26 April 2012, Barcelona, Spain