

## Cleaning clay from fouled membranes

M.W. Armstrong\*, S. Gallego, S.P. Chesters

*Genesys International Limited, Unit 4 Ion Path, Road One, Winsford Industrial Estate, Cheshire CW7 3RG UK  
Tel. +44 1772 749273; email: marmstrong@genesysro.com, sgallego@genesysro.com, schesters@genesysro.com*

Received 26 September 2008; Accepted in revised form 20 August 2009

---

### ABSTRACT

Within the lifetime of most reverse osmosis (RO) systems some fouling will adversely affect membrane performance. The major constituents of foulants found on the first position during six years of membrane autopsy at the Genesys Membrane laboratory are clay minerals chemically known as aluminosilicates. Clay is a naturally occurring material found in all RO feed waters composed primarily of different fine-grained minerals, which exhibit a degree of plasticity (deformation under pressure) depending on the amount of water held by polar attraction in the mineral crystalline structure. Clay deposits are difficult to remove with traditional specialty and commodity cleaning chemicals. This is due to the characteristic of plasticity, the presence of different structural cations and also the impermeability of clay to water. Clay deposits fouling the membrane rapidly reduce flux rates. In order to maintain product water output operators invariably increase feed pressure which compacts the deposit making it less porous and harder to penetrate with traditional cleaning chemicals. Ineffective deposit removal leads to more frequent cleaning and enhanced potential for membrane damage. Clay mineral fouling of membranes therefore requires immediate removal through effective cleaning. This paper explores the chemistry of clay and the mechanisms involved in membrane fouling. The process of developing and testing a new cleaning product Genesol 703 which removes clay deposits from RO/NF/UF systems is described. Comparative results with conventional cleaning products and commodity chemicals are presented. Product efficacy was determined by comparison of membrane flux rates before and after cleaning. The results demonstrate that Genesol 703 is a technically and economically viable cleaning chemical product for the removal of clay deposits from membranes.

*Keywords:* Reverse osmosis; Membranes; Cleaning; Clay; Fouling; Aluminosilicates; Genesol 703

---

\* Corresponding author.