

NatVal 2.2 – Sub-project 2 Development of Validation Protocols for Reverse Osmosis Membranes in Water Recycling



Lead organisation

The University of Queensland
Advanced Water Management Centre
St Lucia Campus, Gehrmann Laboratories, Building 60
Brisbane, QLD 4072

Sub-project Leader

Dr Wolfgang Gernjak
Senior Research Fellow
w.gernjak@uq.edu.au

Sub-project summary

There is universal agreement that reverse osmosis (RO) membranes are capable of achieving high log reductions values (LRV) for pathogens. However a number of studies have shown that the performance of individual RO systems can vary significantly and that high LRV cannot be automatically assumed but should instead be systematically validated.

There are currently no nationally or internationally accepted validation protocols for RO using conventional techniques such as conductivity, TOC or sulphate rejection, and protocols need to be reviewed and approved by relevant regulators on a case by case basis. An agreed validation protocol establishing a correlation between LRV and indirect continuous online monitoring would provide certainty to recycled water treatment plant operators. In particular the ability to ascertain LRV of 3 and above could lower investment costs and generally simplify treatment process trains by reducing the need for additional barriers.

This project will develop validation and verification monitoring protocols for the rejection of pathogens (in particular viruses) using online monitoring and challenge testing techniques for RO spiral wound membranes. Specific objectives are to:

- develop validation guidelines that summarise technical protocols and plant management strategies for a range of LRVs for viruses, taking into account existing references and guidelines as well as operational experience from stakeholders
- understand the failure mechanisms of RO membranes and the time scales over which these occur to develop a monitoring protocol with adequate sampling frequencies
- develop a working measurement principle for an online sulphate sensor capable of low detection limits
- test novel techniques for online validation and challenge testing of RO membranes for LRVs of 3 and above
- evaluate the impact of compromised membranes and the additional benefits of multiple parameter testing
- incorporate research outcomes into a preliminary draft validation protocol

Participants

University of Queensland (UQ)
University of New South Wales (UNSW)
Curtin University (CU)
Victoria University (VU)
WA Water Corporation (WC)