

## NatVal 2.2 – Sub-project 1 Development of Validation Protocols for Membrane Bioreactors (MBRs) in Water Recycling



### Lead organisation

The University of New South Wales (UNSW)  
Rupert Myers Building  
Sydney, NSW 2052

### Sub-project Leader

Pierre Le-Clech  
Associate Professor  
[p.le-clech@unsw.edu.au](mailto:p.le-clech@unsw.edu.au)



Photo courtesy of Veolia Water Australia

### Sub-project summary

Log reductions values (LRVs) currently approved for MBRs in Australia range between 0.5 and 1.5; however, under normal operating conditions, the process has generally been demonstrated to achieve LRVs of 2 and 5 for viruses and bacteria, respectively. This is a reflection of the fact that conditions applied during commissioning validation lead to a significant underestimation of actual pathogen removal performance by MBRs. LRVs are generally credited to brand new membranes and there is a need to understand the changes and subsequent impact on LRVs associated with long-term fouling and the chemical and/or physical stress imposed on membranes during operation.

To obtain regulatory approvals, membrane filtration systems generally need to undergo continuous indirect integrity monitoring and periodic direct integrity testing. The conventional pseudo-direct pressure decay test is known to present some significant limitations in MBR applications, and there is a critical need to better understand and evaluate MBR removal performances under long-term operation based on the use of continuous online monitoring sensors.

The key objectives of this sub-project are to:

- Enact a global survey to collect data on the distribution of LRVs under standard operating conditions and to identify operating conditions leading to removal performance variations
- Understand and characterise the fate and removal of microbial indicators during hazardous events and associated with MBR fouling, cleaning and ageing
- Correlate online monitoring with pathogen LRVs
- Deliver a set of protocols for the continuous validation monitoring of MBR systems, describing detailed methodologies to demonstrate LRVs for a given level of risk.

### Participants

University of New South Wales (UNSW)  
Victoria University (VU)  
Melbourne Water, Koch Membrane Systems