

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



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

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Milestones

28 February 2014 Literature review (including report on industrial data collection) and preliminary draft of validation protocol

1 September 2014 Interim report on experimental research outcomes:

- Qualitative assessment of relevant and likely failure events
- Impact of MBR fouling, cleaning, ageing and failure on water quality
- Correlation between LRV and online monitoring techniques

31 March 2015 Final report on experimental research outcomes and draft validation protocol

30 June 2015 Report on protocol testing and final validation protocol

Budget

Salaries	Operating costs	In-kind contribution	Total value
\$ 411,680	\$ 167,000	\$ 884,095	\$ 1,462,775

Work program

