

Project Brief

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| Long Title | Assigning and maintaining appropriate pathogen LRVs in MBRs |
| Short Title | LRVs in MBRs |
| Problem | <p>Traditionally, Membrane Bioreactor (MBR) Validation is focussed on performance during commissioning when membranes are new, and the range of operating conditions are limited.</p> <p>As membranes age it is important to understand how MBR performance changes to have confidence in the quality of the water produced. Gathering data on the relationships between operational monitoring parameters such as turbidity and pathogen removal during the life of membranes would assist operators to understand the ongoing performance of membranes compared with initial performance.</p> |
| Background | <p>The Water Recycling Centre of Excellence developed the MBR Validation Protocol. This protocol was prepared as part of WaterVal to provide guidance for the validation of MBRs. It proposed a tiered approach that allowed for a simplified process where log reduction values (LRVs) are claimed, as follows:</p> <ul style="list-style-type: none"> • Tier 1 – adopting predefined, conservative LRVs based on the statistical analysis of historical MBR performance data and associated operating conditions. • Tier 2 – conducting challenge testing under specific operating conditions expected for the system being validated to determine the minimum expected LRV and implementing regular testing of target pathogens or surrogates. <p>In addition, a proposed tier 3 approach was described which is more closely aligned with the definition of validation. Under this approach an investigation is undertaken to demonstrate the correlation between online parameter(s) and the pathogen removal performance of the MBR. This allows critical limits to be established that are specific to the LRVs claimed. Until it can be further tested, this new method remains hypothetical and did not form part of the validation protocol.</p> <p>The protocol also identifies target validation pathogens and surrogates and Principal Factors that influence MBR treatment efficiency. Typically, factors that can influence the biological treatment (predation or adsorption) or the filtration step include temperature, hydraulic retention time (HRT), SRT, MLSS, membrane fouling and cleaning, membrane ageing and integrity failures.</p> |
| Objectives | Collect and review performance data from a broad range of operating MBR facilities in Australia to understand the pathogen LRV performance in relation to operating conditions and monitoring parameters. Importantly a range of membrane age and performance will be targeted. |
| Deliverables | 1. Review the literature to understand the relationship between operational monitoring parameters and actual membrane pathogen removal efficiency. |

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| | <ol style="list-style-type: none"> 2. Understand and integrate with the current activities in North America focussed on LRV's and operating conditions in MBRs. 3. Collect data from a wide range of MBR facilities in Australia. This would include operational parameter trends to correspond with direct measurement of pathogen removal (LRV). 4. Analyse this data to understand the performance of MBRs particularly as membranes age. 5. Make recommendations on improvements to the WaterVal MBR protocol. 6. Provide information to participants on how their MBR's are performing against group data. |
| Benefits | <ul style="list-style-type: none"> • Expand and leverage the learnings from the previous WaterVal initiative • Inform future MBR design • Assist in optimising membrane life cycle planning • Provide confidence to operators and regulators on MBR performance • Inform requirements for post MBR disinfection treatment • Maximise the validated operating envelope • Assist in setting critical and alarm limits for Critical Control Points • Lower the whole of life costs of MBR ownership. |
| Stakeholders | <p>Utilities with MBR</p> <p>Utilities considering MBR as a process in reuse schemes</p> <p>MBR manufacturers</p> |
| Research approach | Members only tender |
| Funding: | <input type="checkbox"/> Small (<\$100k) <input checked="" type="checkbox"/> Medium (\$100-\$500k) <input type="checkbox"/> Large (>\$500k) |
| Time frame | <input type="checkbox"/> Short (<6 months) <input checked="" type="checkbox"/> Medium (6-18 months) <input type="checkbox"/> Long (>18 months) <p>Start:</p> |