

Water recyclers' perspectives

based on Street map 7

Water is being recycled all over Australia for a variety of uses. To protect the health of people and the environment, treatment technologies used in water recycling schemes need to meet the performance targets specified in the *Australian Guidelines for Water Recycling*. Across Australia, there is currently no consistent approach to validating treatment technologies against these guidelines. The Australian Water Recycling Centre of Excellence has engaged Water Quality Research Australia to deliver a national framework for validating treatment technologies.

Operators of water recycling schemes are responsible for ensuring that the treatment technologies they use have been validated. Australia's major water utilities and smaller private scheme operators recognise the need for a consistent approach to validation across all states and territories but emphasise that the validation guidelines, while being risk-based, must be pragmatic and flexible.

What is validation?

The *Australian Guidelines for Water Recycling (2006)* require that a treatment technology or process be validated before the water recycling scheme is operational. Validation is the confirmation that the treatment technology meets the specified performance targets. The guidelines describe the concept of and need for validation but do not specify how the validation should be done.

Finding out what water recyclers want

The project team, comprising researchers, industry specialists and regulators, surveyed the views of water recyclers to find out what they need and want from a national validation framework.

The survey was sent to the Water Services Association of Australia (WSAA) and 170 water utilities. Twenty-six respondents completed the survey. Of these, five were small operators (fewer than 10 000 customers), 14 were medium-sized (between 10 000 and 100 000 customers) and seven were large operators (more than 100 000 customers).

Most organisations' experience with validation was with schemes for irrigation of municipal playing fields and golf courses, followed by residential non-potable use, but agricultural use and industrial use also featured.

The key findings from the survey are presented here, along with issues raised by water recyclers at subsequent workshops.

Current issues with validation

Water recyclers generally support the validation approach outlined in the *Australian Guidelines for Water Recycling*, but most of them find it hard to implement due to a lack of consistency in approach, as well as difficulty in obtaining the required testing services. They see some validation approaches as excessively conservative. This can lead to a significant increase in cost for water recycling with little demonstrable benefit and may also lead to water recycling systems being over-engineered.

As an example, Victoria's 2010 draft guidelines for Class A recycled water schemes (i.e. schemes that provide water quality required for unrestricted residential non-potable reuse) are seen as overly conservative for the level of risk identified.

Other challenges water recyclers have with validating treatment systems are the availability of analytical capabilities, the high cost of pathogen analysis and the lack of access to suitable statistical approaches to interpret data.



Photo sourced from Seqwater

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Requirements

Water recyclers identified the following needs from a national validation framework.

Validation guidelines

Validation guidelines need to be risk-based but also pragmatic and flexible.

Validation also needs to be easier to undertake. Because full-scale systems can be exceptionally difficult and impractical to validate, the framework should allow for validating a pilot system and then applying the certification to a full-scale system. The requirement to validate full-scale systems, which can only occur after the system is built and operational, should be minimised.

The quality of source water should be considered, where necessary, and the framework should provide adequate guidance on the requirements for characterising source water.

The current approach of validating each treatment component separately may be overly conservative. The guidelines should give direction as to how to account for the effects of combinations of treatment components.

Roles

The proposed framework administrator and the certification organisation in the draft framework structure could be an existing federal government organisation or statutory body. The certification organisation should have access to independent technical expertise.

Writing of validation guidelines for specific technologies should be outsourced to technical committees with even representation of utilities, regulators, academics and technology suppliers. Technical committees should provide ongoing support to the certification organisation.

“There is widespread support among State and Federal Government stakeholders consulted, for the further development and implementation of the framework, along with backing from the regulatory, utility, private enterprise and research sectors.”

Auditing the validation of treatment systems is seen as important for giving the community and regulators confidence that standards are being adhered to. The certifying organisation should either accredit or employ auditors that are independent of industry and technical suppliers.

Most organisations agreed that analytical facilities should be NATA-accredited, that they need not be government owned, and that they could develop or provide services other than analysis.

Validation database

Most organisations said they were prepared to provide validation data to a national database as long as their intellectual property rights were maintained, data quality requirements were clear and the database was secure. The database would only hold value if operators were allowed to use the data in support of validation.

The database should be held by a national, independent statutory authority or by the framework administrator. It should be established early, and be well supported and maintained because it will become a central resource for the industry. Protocols need to be in place to ensure the quality of the data.

Sampling data should include operational conditions and water quality of both the untreated and treated water.

It was seen to be logical for the certifying organisation to maintain a database of treatment technologies and their capacity for treatment. However, a database that also contains operational verification data, re-validation data and research data volunteered by utilities was seen to be much more useful. Access to such a database should be free of charge to contributors.

Validating *in situ* treatment processes

The certification entity should develop guidelines for validating *in situ* treatment processes. Onsite investigation by the certifying entity would be costly and ineffective because of the need for travel and in-house expertise. Most organisations would prefer to self-assess and provide data for a 'desk-top' certification using clear criteria established as part of the framework.

Existing schemes – should the framework apply?

The framework should apply to existing recycling schemes as long as existing validation is first considered. The priority and timing should be decided by the local regulator and should not be based on a 'zero risk' approach. A phased approach should be allowed for, particularly for organisations that already manage many water recycling schemes.

Re-validation

Most organisations agreed that recycling schemes should be reviewed to determine whether the source water or processes have changed sufficiently that re-validation is required. Clear guidance should be given for each type of treatment system as to the type and extent of operational change that could result in the need to re-validate the recycling system. Re-validation should be designed to minimise operational interruptions to the plant.

International validation

To minimise re-work, and ensure technologies are quickly available in Australia after development, it is seen as vital that the equivalence or otherwise of technology certifications from other jurisdictions (e.g. US EPA) be established early.

The cost of implementing the framework

The Water Services Association of Australia suggests that the cost of implementing the framework should be incorporated into the cost of certification so that it is borne by the greater water community.

Most organisations agreed that independent auditors/assessors, analytical facilities, operators and technology suppliers should pay for certification or assessment of validation reports and that the auditing costs should be borne by the supplier or the operator.

The implications of the proposed framework for water recyclers

Respondents generally believed that the proposed framework would bring minimal changes to the large component of work carried out by water utilities and other water recyclers. It would clarify their choice of treatment technologies and the associated validation requirements. They could choose to install technologies that have already been validated or that are amenable to validation, which may assist to reduce the overall cost of validation. They would still need to meet the regulatory requirements of each state/territory.

They would seek accreditation of their technologies and *in situ* processes by commissioning an independent assessor to oversee the validation testing, and submitting the assessor's report to the certification body. They would document the accreditation of technologies in their water recycling scheme risk management plans.



Photo sourced from Sydney Water



Advantages of the proposed framework for water recyclers

Australia's major water utilities and other water recycling operators recognise the need for a practical national validation system for water recycling that allows a unified methodology across all states and territories. They are highly supportive of the proposed national framework because of the clarity it brings.

Because there is no consistent approach to technology validation across Australia, validation testing of identical or similar technologies is often replicated in multiple jurisdictions.

As well as duplication of effort, there is additional cost and time delays in commissioning of schemes, which can be a barrier to implementation, particularly for small regional utilities and private scheme operators.

Under a national validation framework, water recyclers would benefit as follows:

- Guidelines for validating the various technologies would be nationally consistent.
- A database of certified technologies and performance history would make small-scale water recycling more affordable.
- Water recyclers could choose pre-validated treatment technologies and know that the performance targets would be met. This would make systems easier, faster and cheaper to commission. Most organisations prefer to install pre-validated equipment rather than have to validate a system in situ.
- Validation would provide independent endorsement of technologies and processes.
- Technologies that have already been validated overseas may not require further validation in Australia.
- Once a technology was certified, validation would not need to be repeated unless the treatment process changed significantly.

Challenges

- The validation framework must have the support of health regulators nationally.
- The validation guidelines need to be risk-based without being so conservative that they are essentially aiming for zero risk. The emphasis should be on pre-validation either by certification or at the pilot scale, with a focus on operational monitoring and verification sampling to complete validation on full-scale recycling systems.
- The most critical aspect of the certifying organisation will be its independence from technology suppliers, and its ability to draw on independent technical expertise to evaluate the technology and its validation.
- Organisations may have regulatory issues or commercial confidentiality concerns about contributing data to the national database.
- All stakeholders need to receive appropriate training.

Research gaps

The most appropriate way to validate a treatment system is through online monitoring of surrogates that are sufficiently sensitive to determine when a treatment process is underperforming. The key research gaps are in identifying sufficiently sensitive surrogates, and correlating them with the removal of the hazards of concern.

National Validation Framework factsheet suite

This brochure is based on a 'road map' report funded by the Australian Water Recycling Centre of Excellence. The 'road map' describes a national approach for validating treatment technologies, and was based on extensive consultation with stakeholders.

This brochure is one of a series that describes the outcomes of the first stage of this national validation project.

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For further information visit www.australianwaterrecycling.com.au

Other brochures in the series cover:

- > An overview of the draft National Validation Framework
- > Perspectives of water recyclers, technology suppliers and regulators
- > Validation of various treatment systems
- > Building capacity in the industry