

HEALTH BASED TARGETS

An Australian Water Industry Snapshot: Outcomes from 2014 Health Based Target implementation pilots

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working group

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WATER SERVICES
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Outcomes from 2014 Health Based Target Implementation Pilots

1. Background

The National and Health Medical Research Council (NHMRC) are responsible for producing and updating the Australian Drinking Water Guidelines (ADWG), the authoritative reference in Australia for drinking water quality. In 2009, NHMRC produced a discussion paper on the introduction of a Health Based Target (HBT) for microbial water quality.

The Water Services Association of Australia (WSAA) is the peak body representing the urban water industry in Australia. Its members provide water and sewerage services to over 20 million Australians. WSAA water quality professionals first considered the HBT proposal at a meeting in December 2011. The adoption of a HBT provides the opportunity to introduce a consistent approach to water treatment process selection and operation across Australia. Accordingly, it received widespread but cautious support from the majority of water quality professionals.

2. WSAA Health Based Target

In August 2012, the WSAA HBT Working Group was formed to assess the impact on water utilities if an HBT of one micro DALY, considered the most likely HBT, was adopted. The HBT Working Group comprises of Richard Walker (Water Corporation of Western Australia, Chair), Arran Canning (South East Queensland Water), Mark Angles (Sydney Water), Andrew Ball (WaterNSW), Melita Stevens (Melbourne Water), Cliff Lister/Jason West (South Australia Water), Greg Ryan (South East Water), Peter Spencer/Steve Capewell (Water Corporation of Western Australia) and Dan Deere (Water Futures).

The primary objective of the Working Group was to produce a guidance manual so Australian drinking water utilities can consistently assess the source risk, the effectiveness of water treatment barriers and ultimately the safety of water delivered to customers.

3. HBT Manual Development and Pilots

The HBT Manual was written between June and November 2013. The HBT Working Group completed 'case studies' on schemes managed by their utility to trial the HBT Manual. Satisfied with the outcomes, a small pilot was arranged with two regional utilities from Victoria and a mid-size urban utility in NSW. This pilot was undertaken between March and June 2014.

Improvements were made to the Manual based on feedback from the first pilot. A second more extensive pilot was undertaken between September and December 2014. Sixteen water utilities participated – a mix of mid-size urban and regional utilities from Victoria, New South Wales, Tasmania, Northern Territory and Australian Capital Territory together with local councils from NSW and Queensland. Regional schemes in South Australia and Western Australia were completed in late 2013. This means every state and territory had some involvement in the HBT Manual evaluation.

Each pilot was reviewed by Richard Walker, Chair of the HBT Working Group. The purpose of the review was to confirm that the principles in the Manual had been correctly interpreted and applied.

The quality of the reports was of a high standard and in some cases outstanding. Generally, judgements were sound and the outcomes consistent across utilities.

4. HBT Questionnaire

Following the second pilot, thirteen utilities who participated in the pilots completed an extensive questionnaire canvassing their views on the Manual and the results. This was followed by an HBT workshop in Melbourne in February 2015. The workshop was attended by over 50 delegates representing over 20 utilities. The following information was collected from the HBT pilots, questionnaire and workshop.

It must be remembered that this represents feedback from a cross section of 'non-major urban' water utilities. This is significant because most of the water industry concern about introducing a HBT was associated with the capacity of smaller utilities to implement this initiative and the costs that might result.

The questionnaire was designed to determine information on:

- resourcing the implementation of the HBT manual
- improvements required to meet the HBT
- management of critical control points
- integration with the ADWG
- governance arrangements
- how utilities rated the manual
- support for introducing a HBT.

Seventy-one water supply systems were evaluated in the pilots. Information from the questionnaire and pilots provides a rare snapshot of the status of water quality management for a large cross section of non major urban water utilities in Australia. When reviewing this information, water utilities were given a copy of the HBT Manual and asked to implement it over a period of six weeks. No training was provided. A helpline was available but most participants relied on their own interpretation and judgement.

5. Resourcing Implications

Survey questions were designed to determine how much resource was required to implement the HBT Manual and where the effort was expended. It showed:

- a) The average effort per scheme was between 4 and 7 person days.
- b) Once familiar with the HBT process, most utilities anticipated less effort would be required, probably about 20% on average.
- c) About half the assessments were completed in less than 2 weeks elapsed time and 85% in less than 4 weeks. Again, this was expected to reduce with familiarity with the HBT process.
- d) The HBT assessments were almost universally carried out by 'in house' resources. Only one water utility used a consultant for a small part of the evaluation
- e) Effort was fairly evenly distributed between

- sanitary survey
- source assessment
- water treatment assessment
- report documentation

Discussion: The resource effort is quite modest considering the importance of the outcomes. It is pleasing that the HBT assessments can be carried out in house. This ensures ownership of the outcomes.

6. Australian Drinking Water Guidelines Comparison

Survey questions were designed to understand how well some existing key ADWG requirements were implemented. It showed:

- Only 23% of utilities used an existing sanitary survey to complete the source risk assessment
- 46% had to update an existing sanitary survey while 30% undertook a new survey
- 58% were able to use existing routine Critical Control Point (CCP) reports to complete the water treatment assessment
- 17% had to develop new data integration reports while 58% relied on a manual review
- 85% thought implementing the HBT Manual required the utility to do more than is currently done to manage water quality
- 53% thought implementing the HBT Manual required the utility to do more than required by the current ADWG
- 85% thought implementing the HBT Manual would save time in the long run by standardising the risk assessment process

Discussion: It is a concern that the majority of utilities did not have current sanitary surveys but understandable since they do not lead to direct action. This will change if the HBT Manual is adopted.

The uptake of CCP reporting and management is better but it appears over half the utilities do not routinely report CCP performance or do not report the parameters recommended in the ADWG. Again, this will improve dramatically with adoption of the HBT Manual.

Based on the above, it is apparent that the HBT Manual is requiring utilities to do more than is currently undertaken. Surprisingly, many utilities thought the Manual would require them to undertake more than the current ADWG. This is not the case. There is not a single activity in the HBT Manual that is not a requirement of the ADWG.

At the workshop the view was that the depth of analysis required in the HBT Manual is more than how some interpret the ADWG.

7. Training/Skills

Survey questions were designed to determine if utility staff had the skills to implement the HBT Manual. It showed:

- Even very small water utilities were able to effectively implement the manual using in house resources
- Some minor training needs were identified in the following areas:
 - sanitary survey
 - vulnerability assessment
 - quantifiable microbial risk assessment
 - water treatment operation
 - data collection and interrogation
- Many benefits outside the immediate HBT assessment were obtained by implementing the HBT Manual. More than 50% of respondents indicated that it:
 - promoted teamwork and collaborative across functional areas
 - promoted learning and awareness and 'know your system'
 - enhanced the linkage between catchment management and water treatment
 - discovered problems and improvement opportunities for water treatment
 - provided support for business cases for improvement projects
 - was an enjoyable process
 - generated enthusiasm from participants
 - can be used by planners and designers of new sources and water treatment plants

Discussion: Assessments were predominantly completed by utility staff. Utilities are confident they have the required skills and knowledge with only minor training needs identified.

Specialist consultants are not required. There are many other benefits derived from undertaking a HBT review.

8. Water Safety

Seventy-one water supply systems were assessed in the pilots. The distribution of safety outcomes along the water safety continuum was:

Location on continuum	Number of schemes
One Micro DALY	40
Safe (1-15 micro DALY)	52
Marginal (15-150 micro DALY)	14
Not determined	5*

* Three were groundwater schemes thought to be water under the influence of surface water which was beyond the scope of the Manual at that time. One scheme had recently upgraded treatment with insufficient data to make an assessment. One scheme had non-standard water treatment which could not be assessed using the HBT Manual.

Discussion: The results are as expected. More than 50% of water supply systems are achieving one micro DALY. This confirms that conventional well-designed and operated systems can deliver one micro DALY and the HBT is not 'raising the bar'.

Prior to undertaking this project WSAA thought that most schemes were safe and this has been confirmed.

Some schemes were marginal and need improvement. This is not surprising given the lack of national standards and confirms the benefits of adopting a HBT.

9. Improvements Identified

Where improvements were required, questions were asked to determine the type and scale of work required. The responses are summarised below.

Source Protection

- 40% of utilities identified potential capital works in the catchment to reduce source risk. Examples include signage, fencing, flow diversion, establishing response buffers and effluent management
- 60% of the utilities identified operational improvements to reduce source risk. Examples include employing a ranger, improved source harvesting, improved sanitary survey and stakeholder management.

Existing Water Treatment

- 60% of utilities identified potential capital works improvements. Examples include instrumentation, enhanced coagulation and filter to waste
- 60% of utilities identified potential improvements to water treatment operations. Mostly this involved additional monitoring and process performance assessment.

New Water Treatment

- 45% of utilities identified a need for additional or modified treatment processes. Examples include UV installation and converting from chloramination to chlorination for primary disinfection.

Expenditure Avoidance

In some cases the HBT pilots showed that some proposed improvements were not required or outcomes could be achieved with alternative and less expensive methods.

About 23% of utilities identified expenditure avoidance potential.

Discussion: It is pleasing that many utilities are considering improvements to source protection rather than immediately planning for improved treatment. It is far better to reduce the hazard than install additional barriers.

Improved monitoring was a common need – either to reduce uncertainty or claim additional log credits.

Where additional treatment is required it is generally at the low end of cost and sophistication (e.g. UV).

10. Cost of Introducing an HBT

An attempt was made to cost the improvements identified for each scheme in the pilots. At the HBT workshop, it was agreed that it was inappropriate to extrapolate these costs to produce a whole of industry cost.

It was noted that:

- 75% of utilities identified the need for capital work
- 80% of these projects had been previously identified
- 50% of the projects were included in capital plans
- All projects identified in the HBT pilots were now considered necessary to meet the current ADWG and not directly attributable to the adoption of a HBT

Discussion: WSAA has subsequently accepted the position that:

- adopting a HBT will not result in significant infrastructure investment for WSAA members over that required to fully implement the current ADWG
- timing of improvements is enhanced by the HBT approach.

11. SCADA and Critical Control Point (CCP) Management

CCPs should be continuously monitored with appropriate targets, critical limits and alarms. Commonly, monitoring is overseen by a SCADA system that incorporates a data storage facility. This data is retrieved to produce routine performance reports.

Survey questions were aimed at determining whether systems deployed to manage CCPs were adequate to meet the ADWG. The responses showed that:

- 86% of utilities were continuously monitoring CCPs
- Most systems were configured with suitable alarms to provide early warning of target and critical control limit breaches
- Less than 40% of utilities generated the performance reports recommended in the ADWG.

Discussion: SCADA systems are virtually universal and most are set up to support CCP management in an HBT environment.

CCP reporting needs improvement at many utilities.

12. Governance

In terms of microbial water safety, good governance should capture the following elements

- risk assessment process and outcome
- source challenge rating
- water treatment performance
- good practice rating
- verification monitoring

Questions were asked to determine:

- the existence of appropriate processes
- what was reported to whom across the utility

The responses indicated that:

- a) Reporting of operational performance indicators is very inconsistent across utilities. Reports are sporadic and generally absent at the Executive and Board level
- b) *E.coli* performance is the only indicator consistently reported at Management/Executive/Board level.

Discussion: the ADWG 2004 made the point that *E.coli* monitoring cannot guarantee the continuous safety of drinking water. This can only be achieved by continuous and effective operation of CCPs.

It seems the industry has been slow to adopt this paradigm.

13. Duty of Care

Duty of care involves protecting customers from foreseeable harm. Utilities were asked whether they were comfortable they were discharging their duty of care. The responses indicated:

- 75% of utilities indicated they were comfortable
- To back up this claim, utilities mentioned
 - their HACCP systems
 - internal procedures
 - *E.coli* performance

Discussion: This confidence is misplaced for most utilities since:

- a) There is no definition of 'safe' at present in Australia
- b) There is no agreed process to determine adequacy of water treatment (the most important barrier for pathogen control)
- c) Most utilities don't have current sanitary survey (ADWG requirement)
- d) Most utilities are not monitoring and reporting CCP performance in accordance with the ADWG
- e) There is no Executive oversight of performance parameters critical to water safety

14. Rate the Manual

The Manual was implemented by utilities without any training. This situation is unlikely to change so it has to be a self-sufficient document. Pilot participants were asked to rate the Manual. Their responses showed:

- 75% rated it 4 and 5 out of 5 for readability
- 75% rated it 4 and 5 out of 5 for ease of understanding
- 56% rated it 4 and 5 out of 5 for ease of implementing
- 67% rated it 4 and 5 out of 5 for supporting implementation of the ADWG
- All respondents thought the Manual produced reasonable outcomes
- 92% were comfortable with the technical aspects of the Manual

Discussion: Most users were satisfied with the Manual and rated it highly.

15. Support for an HBT

Three years ago, the water industry had little knowledge of the implication for adopting an HBT. Respondents were asked whether they would support introduction of an HBT based on their knowledge and experience with the HBT Manual. Their responses showed:

- 85% indicated support for adoption of an HBT
- those who did not support its introduction had concerns about how it would be incorporated in the ADWG and consistency of application by regulators.

16. Summary

1. The HBT Manual has been well received by WSAA members. It effectively fills the gap in the current ADWG with respect to adequacy of water treatment and setting operational performance targets
2. Water quality professionals in regional areas have demonstrated they possess the skills and judgement to implement the Manual. There is no need to employ consultants for this task. Water Quality Managers in regional areas have demonstrated a high level of competency and commitment during the HBT Manual development and pilots. Water quality is in good shape.
3. Water quality professionals expressed satisfaction with the technical content of the Manual and felt it produced reasonable outcomes. The water safety analysis generated few surprises.
4. Improvements identified in the water safety analysis were already generally known or suspected. The Manual confirmed these needs and was rated very beneficial in compiling strong business cases for these improvements.
5. All improvements were considered necessary to fully implement the current ADWG and not directly attributed to adoption of the HBT. A major advantage of the HBT process is a consistent process for prioritising improvements to provide the greatest public health benefit
6. The pilots showed a need for general improvement by utilities in the following areas
 - currency of sanitary surveys
 - management and reporting of CCPs
 - water quality governance

It is expected performance in these areas will substantially improve as the HBT Manual is rolled out. Adequate governance will require strong Executive advocacy in each utility.

7. There is strong support within the water industry for the introduction of an HBT subject to the metrics and philosophies in the WSAA Manual being incorporated into the ADWG and adopted by Health and other regulators
8. Regardless of whether an HBT is incorporated into the ADWG, the HBT Manual is here to stay and will make a significant contribution to water quality management and water safety.