



The Evolution of the Drinking-water Standards - Determining what 'monitoring' may look like in the near future

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INTRODUCTION

New Zealand is currently undergoing substantial regulatory reform with regards to drinking-water compliance and safety. For the first time in decades the scope and content of the Drinking-water Standards for New Zealand (the Standards) may be very different to what we have traditionally seen and applied. As a sector we have become reliant on the Standards defining 'what, where, when and how' to monitor water quality. The Standards have also been the yardstick used by government bodies to provide the measure of a supplier's level of water quality compliance. The prominence of a binary pass/fail mindset and a considerable reliance on the Standards has created an assumption that if you meet the Standards your water is 'safe'. The thresholds within the Standards should have always been considered a compliance tool, not a measure of, or instrument for achieving safety. This article touches on the history of monitoring for compliance through the Standards, where we may be heading via future regulatory reform, and whether an opportunity now exists for the industry to re-define water quality monitoring practices.

THE STANDARDS - BREADTH AND DEPTH OF MONITORING

The Standards defines monitoring as; *"Sampling and analysis of a drinking-water supply to test for compliance with the DWSNZ, or for process control, by detecting changes in the concentrations of its constituent determinands or deviations of these from target values."* The fact that the term 'compliance' is specifically mentioned in the definition of monitoring, has created a mindset that where Standards monitoring has been met, both compliance *and* safety has been achieved.

The complexity of untangling the outcomes of manual monitoring compared to continuous monitoring is only recently becoming better understood and accepted by the water industry in New Zealand. From the Havelock North Inquiry, the sector now understands that *E.coli* monitoring in particular has limitations. From the time an *E.coli* sample is taken to the time the result is notified contaminated water is being consumed. This effectively could result in the water being unsafe for 24hours or more before any remedial action could be applied. However, manual sampling is still chosen over continuous monitoring because of its reduced costs and ease of application. There are also what we consider to be compliance "loopholes" when utilising manual monitoring. The Standards approach to 'permitted (allowable) exceedances' can move contamination events (such as transgressions detecting *E.coli*) from a non-compliant to compliant state after reactively increasing samples in the given compliance period. This has created an 'unfair playing field' for supplies that do utilise continuous monitoring practices. For example, continuous bacteriological monitoring requirements (Criterion 2A) denote that once a performance parameter is exceeded, compliance is outright failed with no provision for 'allowable exceedances'. In essence you may not comply for 4 minutes of a single day and you become non-compliant outright compared to a supplier who utilises manual bacteriological monitoring approaches who can utilise the allowable exceedances approach.

So why would suppliers potentially invest in continuous monitoring practices if compliance outcomes (binary pass/fail) are not going to reflect the increased assurance of the quality of the water that comes from online continuous monitoring? It is our understanding that whilst previous iterations of the Drinking-water Standards (for example the 2005 (revised 2008)) were intended to *promote* the use of continuous monitoring over manual monitoring, this nuance wasn't explicitly described or addressed through regular revisions of the Standard.

THE HEALTH ACT 1956 – INTERTWINED WITH THE STANDARDS

Since their first publication in 1984, the Standards had been a voluntary 'standard' before being becoming a legal instrument through an amendment to the Health Act 1956 (the Act) in 2007. The Act first legally mandated the Standards by requiring suppliers to take "all practicable steps". This qualifier, which included a consideration of affordability, was removed in 2019 in a legislative amendment. Whilst the Standard's is a paramount instrument (considered 2nd tier legislation), the Act does not adequately enhance the Standards application. This situation was clearly identified by the Havelock North Government Inquiry which noted deficiencies around the prescriptive requirements relating to the ability to adopt, amend or revoke the Standards (requiring long consultation periods).

The strict legislative requirements for reviewing, amending and adopting new standards works against the Standards being systematically updated to align with industry best practice. Operationally, we believe this has severely prevented the Standards from reflecting best practice, by;

- Not recognising new and emerging hazards
- Not accounting for advancements in water treatment and water monitoring capabilities
- Being overly focused on treatment performance and not source water or distribution system performance with which there are prevalent risks that apply to these supply components.
- Allowing for ill-equipped drinking-water management/monitoring approaches (such as 'secure ground water') which was a key focus of the Havelock North Inquiry.
- Not adopting reciprocal consideration of international approaches and learning.

What the sector has since learned following the Havelock North water supply contamination event in 2016 is that our reliance on the Standards and an ambition to be 'compliant' has distracted us all from the desired goal of providing safe drinking-water. Therefore, the role of water quality monitoring for performance and risk is an essential element of safety but not the exclusive tool to achieve this goal.

WATER SAFETY PLANS – INTERTWINED WITH THE STANDARDS

Water Safety Plans (WSPs) are instruments which define 'how' water suppliers produce and then maintain a supply of safe drinking-water from catchment-to-tap with which monitoring is a large part of substantiating safety.

WSPs are a current requirement under the Health Act 1956 now and appear to be a key legislative requirement going forward under the Water Services Bill. The Government has released multiple documents in the form of guidance material in relation to the design and development of WSPs. During 2018 and 2019, the Framework and Handbook for WSPs was released to the water sector. Within both the Act and the Handbook there is an intertwined co-dependence on the Standards. In particular, 'Component 5' of the Handbook directly discusses the requirements to detail how monitoring against the Standards is (or will be) achieved. This has potentially created confusion for water suppliers as to whether the goal of the Framework/Handbook is to undertake water quality monitoring in a way that corresponds to the level of contamination risk or prescribe how monitoring

for compliance is being applied. Untangling the primary goal of the WSP versus the Standards from a monitoring perspective is something that would be beneficial for the New Zealand water industry.

In the international food and water supply sector it is largely accepted that continuous monitoring in particular provide greater oversight and efficacy from a quality control and risk management perspective. This is especially pertinent at critical points in the production components of a supply/manufacturing process. These are captured through Food Control Plans or Food Safety Plans (equivalent to WSPs) which are both a measure of determining safety and a mechanism with which regulatory compliance is achieved. Going forward, WSPs *could* provide a potential viable framework with which monitoring for both safety and compliance is undertaken. Appropriate and adequate guidance material and instructions around how to statutorily implement and report against this would need to be developed.

POTENTIAL POSITIVES OR NEGATIVES OF A 'FRESH PERSPECTIVE'

In terms of technological advancements at this point in time, there is still a place for manual sampling. Pathogenic or targeted organism based testing in the water sector will continue to exist especially whilst new smart monitoring systems may not yet; be considered at a point where they can be used outright across a water supply system (for example in the distribution system), be considered completely fail safe, and be equitable in nature.

The development of the Water Services Bill¹ and a review of the Standards have the potential to positively redefine the role and purpose of 'monitoring' encompassing both safety and 'compliance'. This view is founded on the basis that the Water Services Bill prescribes system-wide monitoring requirements under the requirement for having a WSP, the ability to develop/issue compliance rules, and mandate source water quality monitoring.

What would a successful regulatory based monitoring approach look like? What form it takes may not be of paramount concern rather it is the way it is fundamentally developed and how it will be allowed to be revised to maintain relevance. Some thoughts include;

- An equity and proportionality lens must be applied with regards to monitoring for small, remote, or low socioeconomic communities.
- Seek direct and early engagement from water suppliers, science advisors, and equipment suppliers to develop a holistic understanding of 'monitoring' that is specific to the needs of the water sector.
- Encourage broader consideration of 'how' monitoring is undertaken, whilst ensuring it is 'fit-for-purpose' and directly corresponds with supplies hazards and risks.
- Provide incentives for suppliers who utilise continuous monitoring capabilities.
- Define monitoring requirements in a way that does not limit new technologies or referee methods from being applied, and then directly allow for wider acceptance of technologies and/or referee methods/standards which have achieved international validation (or otherwise) beyond defining our own bespoke domestic requirements.
- Provide guidance in relation to regulatory expectations when managing, maintaining and storing continuous monitoring data.
- Encompass and encourage the use of *wider* continuous monitoring parameters and practices especially in relation to network/distribution zone monitoring.

¹ New Zealand Government. 2020. Bill 314-1.

http://www.legislation.govt.nz/bill/government/2020/0314/latest/LMS374564.html?search=ts_act%40bill%40regulation%40deemedreg_water+services+bill_resel_25_a&p=1.

New Zealand promotes itself as a contributor of information technology, and with the rapid advancements of water quality monitoring systems (and perhaps the development of artificial intelligence), the future potential regulatory framework allows us to prepare for and embrace such opportunities without the need to keep redefining regulations, standards or otherwise. Where we may end up with monitoring is not entirely clear at present, but what we want to be cognisant of, is learning from the past and using this to prepare us for the future.

ABOUT THE AUTHORS

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