

# Review of health response into Waikouaiti water supply lead contamination.

**Final Report**

**31 March 2021**



## **Authors**

Dr Heather Uwins-England

Dr Jill McKenzie

## **ACKNOWLEDGEMENTS**

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## **GLOSSARY OF TERMS**

BLL – Blood Lead Level

DCC – Dunedin City Council

DHB – District Health Board

DWA – Drinking Water Assessor

DWSNZ – Drinking Water Standards of New Zealand 2005 (Revised 2018)

ESR – Institute of Environmental Science and Research

IMT – Incident Management Team

MAV – Maximum Acceptable Value

MoH – Ministry of Health

MOoH – Medical Officer of Health

PHRA – Public Health Risk Assessment

PHS – Public Health South

WCL – Wai Comply Ltd

## EXECUTIVE SUMMARY

On Tuesday 2 February 2021, Dunedin City Council (DCC) advised the customers of the Waikouaiti drinking water supply not to use the reticulated water supply for drinking, cooking or preparing food until further notice. The Waikouaiti drinking water supply services the Waikouaiti, Karitane and Hawksbury communities. Lead concentrations above the maximum acceptable value (MAV) in the Drinking Water Standards for New Zealand 2005 (Revised 2018) (DWSNZ) were intermittently detected in samples taken from these supplies from July 2020. The “Do not drink” notice was given based on advice from Public Health South (PHS) due to concerns of possible acute and chronic health issues for consumers.

Lead is a cumulative toxin. Following exposure it is taken up into the various tissues of the body, including the bones, and is slowly released. The primary concern with lead as a toxicant is from chronic exposure, particularly in children and the unborn foetus. Lead exposure via drinking water is of concern as it provides an additional route for ongoing exposure over time.

The Director-General of Health commissioned a rapid review of the health system response to the Waikouaiti water supply lead transgressions. This review examines how local and central government health agencies have responded to intermittent elevated lead levels in the Waikouaiti drinking water supplies and consider if there are any required amendments to health legislation, compliance and operational processes to improve public safety and reduce risk to health and wellbeing.

Relevant documentation held by the Ministry of Health (MoH), Public Health South (PHS), Wai Comply Limited (WCL – contracted Drinking Water Assessors) and Institute of Environmental Science and Research (ESR) was identified and reviewed. This included relevant laboratory reports, meeting minutes, situation reports, correspondence, emails, procedures etc. A timeline of the event was established.

The reviewers considered the timeliness and appropriateness of actions and responses from MoH, PHS and WCL based on the information provided to them from DCC and the timeframes in which that information was provided.

The reviewers consider that WCL’s escalation of the lead exceedance to PHS and MoH was done in a timely manner. The advice given to DCC regarding further investigations of the lead exceedance was sound and timely, considering the limited information Wai Comply had at that point in time.

The reviewers also consider that the advice to issue a ‘do not drink’ notice by PHS on 2 February and to undertake blood lead level (BLL) screening of the community on 4 February was timely and appropriate. The roll out of BLL screening in the community was extremely efficient and fast, with the testing commencing the next working day after it was announced to the community. PHS, WellSouth, Southern District Health Board, the Ministry of Health

and the Waikouaiti Community Board should be commended for their efforts in the establishment and roll out of community BLL screening.

The MoH provided full support for PHS in the decision to undertake BLL testing. An Incident Management Team (IMT) was established on the 4 February 2021 to coordinate the health response and ensure the availability of free BLL testing.

The results from BLL testing for Waikouaiti, Karitane and Hawksbury community residents showed that people in these communities generally had blood lead levels below notifiable levels and in line with national data. Long term exposure to lead from the water supply seems unlikely.

At the time of this report, the lead issues in Waikouaiti drinking water supply are still ongoing and the IMT has not been stood down. The Ministry continues to provide Situation Reports and continues to support PHS and the Drinking Water Assessors (DWAs) as required.

Although the lead contamination event in Waikouaiti is ongoing, the public health response to date has been timely and appropriate. Key community stakeholders have reported that throughout this event, public communication and community engagement by PHS and DCC has been timely and appropriate. Internal procedures within the Ministry of Health and Public Health South were followed and ensured excellent management of this event. No legislative levers or powers were required or used at the time of this report.

This review has identified several areas in the current and proposed regulatory framework from drinking water where improvements to could be made. This includes issues such as reporting of maximum acceptable value (MAV) exceedances by laboratories and drinking water suppliers, timely access to expert advice, lack of direction in the current standards with reporting of non-priority 2 determinands, issues with determining compliance to chemical standards, the importance of timely public health risk assessments and responses, and concern with New Zealand plumbing standards. This report contains 12 recommendations for the Director-General of Health and Taumata Arowai to consider. Taumata Arowai will become the national regulator for drinking water on, or soon after, the 1 July 2021 (see section 1.3) and will be best positioned to take account of these recommendations, insofar as they are relevant, once the Water Services Bill is enacted.

# 1. INTRODUCTION

## 1.1 Background

On Tuesday 2 February 2021, Dunedin City Council (DCC) advised the customers of the Waikouaiti drinking water supply not to use the reticulated water supply for drinking, cooking or preparing food until further notice. The Waikouaiti drinking water supply services the Waikouaiti, Karitane and Hawksbury communities. Lead concentrations above the maximum acceptable value (MAV) in the Drinking Water Standards for New Zealand 2005 (Revised 2018) (DWSNZ) were intermittently detected in samples taken from these supplies from July 2020. The “Do not drink” notice was given based on advice from Public Health South, due to concerns of possible acute and chronic health issues for consumers. The source of the contamination and the duration of the contamination was unknown. A decision was made by the Ministry of Health (MoH) and Public Health South on 4 February 2021 to facilitate blood lead level (BLL) screening of consumers. An Incident Management Team (IMT) was established by the MoH on 4 February 2021.

The Director-General of Health commissioned this rapid review of the health system response to the Waikouaiti water supply lead transgressions which commenced on 19 February 2021.

## 1.2 Scope of the review

The review examines how local and central government health agencies have responded to intermittent elevated lead levels in the Waikouaiti drinking water supplies and consider if there are any required amendments to health legislation, compliance and operational processes to improve public safety and reduce risk to health and wellbeing.

The review includes the following:

- analysis of the water testing results;
- actions taken in response to the lead readings;
- when and what information was passed on to relevant organisations and or authorities;
- appropriateness and timeliness of how the relevant information was disseminated;
- what levers/powers within the current regulatory system were/are being used to address this situation;
- recommendations for changes that could be undertaken immediately or that need to be considered as part of the wider regulatory changes currently being considered; and

- provide advice on any other matters that may be relevant arising from this review.

The Review does not include the following as these are out of scope:

- Dunedin City Council's responses and actions in regards to the incident. (This report is a health sector review not a drinking water supplier compliance investigation).
- The specific cause or source(s) of the lead contamination, including any corrective or preventative measures.
- Any specific health advice or support provided to individual community members with elevated lead concentrations in blood. It does however review the process, rationale, timeliness and steps taken to undertake blood testing in the community and the health sector's proposed (or actioned) approach to support community members in general in response to the results of blood tests.
- Analysis of blood test results. (An analysis of the potential public health impact of elevated lead concentrations in drinking water will be examined, however an analysis of the actual health impact (if any) due to this event will not be undertaken).

### 1.3 Current and proposed regulatory framework for drinking water

Drinking water is currently regulated under Part 2A of the *Health Act 1956*<sup>1</sup> administered by the Ministry of Health. Most of the assessment and compliance functions are devolved to District Health Boards where Drinking Water Assessors, Designated Officers and Medical Officers of Health carry out various roles. The Ministry of Health administers the Drinking-Water Standards for New Zealand 2005 (Revised 2018) and publishes numerous guidelines to support and encourage drinking water suppliers to be compliant with the Act and the Standards and to identify and manage risks associated with drinking water.

There will be significant change to drinking water regulation in 2021. A new national water regulator, Taumata Arowai, has been established and is expected to commence operations on 1 July 2021 or soon after. A Water Services Bill is currently before the Health Select Committee for consideration<sup>2</sup>. The Bill provides for a strengthened regulatory framework for drinking water. When the Bill receives Royal Assent and is enacted, Taumata Arowai will be the sole administrator of the new Act. The new Act will enable Taumata Arowai to make significant changes to the drinking water standards and to establish new compliance rules for drinking water suppliers.

This report gives recommendations to both the Ministry of Health and Taumata Arowai as the current and future regulators of drinking water.

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<sup>1</sup> <https://www.legislation.govt.nz/act/public/1956/0065/latest/DLM305840.html>

<sup>2</sup> [https://www.parliament.nz/en/pb/bills-and-laws/bills-proposed-laws/document/BILL\\_99655/water-services-bill](https://www.parliament.nz/en/pb/bills-and-laws/bills-proposed-laws/document/BILL_99655/water-services-bill)

## 2. METHODOLOGY

This review commenced on 19 February 2021 with a draft report provided to the Ministry of Health on 17 March 2021 and a final report on 31st March 2021. The review has been done in 4 phases:

- Phase 1 – Information gathering (19 February - 5 March);
- Phase 2 – Evaluation of information (1 – 9 March);
- Phase 3 – Drafting of report (9- 17 March);
- Phase 4 – Finalisation of Report (18 – 31 March).

### 2.1. Phase 1 – Information gathering

Relevant documentation held by the Ministry of Health, Public Health South, Wai Comply Limited and Institute of Environmental Science and Research (ESR) was identified and collected. This included relevant laboratory reports, meeting minutes, situation reports, correspondence, emails, procedures etc. Additionally, publicly available information was reviewed, this included YouTube videos of public meetings and various websites.

A time-line of events and response actions was established and gaps in information determined. Key stakeholders were identified and interviewed.

It should be noted that the Waikouaiti water supply lead contamination event had not been resolved during this phase of the review. Indeed, the health response was still very much in progress with preparations for community meetings and evaluation of blood lead level tests still being undertaken. As such, this review could only cover the health response up to a certain point in time.

Additionally, it was considered that interviewing certain community stakeholders may cause confusion or further anxiety for the stakeholder and potentially interfere with the response work being undertaken by Public Health South and the Dunedin City Council. It was decided that these stakeholders would be interviewed after the event has been resolved and an addendum to this report will be provided to the Ministry by the reviewers. These stakeholders included community representatives and local iwi. However, the Chair of the local Community Board, and the manager of Kati Huirapa Runaka Ki Puketeraki were interviewed and this decision explained to them.

Interviews were conducted with:

- WaiComply (WCL):
  - Deirdre Nagle, CEO;
  - Matthew Parkinson, Drinking Water Assessor; and

- Scott Rostron, Technical Assessor.
- Public Health South (PHS):
  - Dr Susan Jack, Medical Officer of Health;
  - Dr Michael Butchard, Medical Officer of Health;
  - Susan Moore, Regulatory & Protection Team Leader;
  - Rosemarie Nelson, Acting as a Designated Officer for this incident;
  - Simon Ou, Drinking Water Assessor.
- Ministry of Health (MoH):
  - Karen Beirne, Manager, Drinking Water;
  - Hamish Hann, Senior Advisor, Drinking Water.
- Waikouaiti Community Board:
  - Alasdair Morrison, Chair, Waikouaiti Community Board.
- Dunedin City Council (DCC):
  - Sandy Graham, Chief Executive;
  - Simon Drew, General Manager, Infrastructure Services.
- Kati Huirapa Runaka ki Puketeraki
  - Suzanne Ellison, Runaka Manager

## **2.2. Phase 2 – Evaluation of information**

Any incident and emergency response procedures or guidelines for the relevant parties were reviewed. The time-line of events and responses were compared to established incident and emergency response procedures

The levers/powers that were used and the appropriateness and timeliness of exercising any powers was reviewed. Other relevant statutory powers/levers that could have been used were considered.

The wider regulatory changes currently under consideration by the Health Select Committee (The Water Services Bill) and other relevant aspects of the new regulatory framework were reviewed with a view to determine if the proposed new framework could be enhanced/strengthened based on learnings from this event.

### **2.3. Phase 3 – Drafting of report**

The draft report was prepared and submitted to the Ministry of Health on 17 March 2021.

### **2.4. Phase 4 – Finalisation of Report**

This final report was submitted to the Ministry of Health on 31 March 2021.

### **3. THE LEAD CONTAMINATION EVENT**

#### **3.1. Lead in Drinking water**

Lead can be present in drinking water as a result of dissolution from natural sources, or from plumbing systems containing lead. These may include lead in pipes, or in solder used to seal joints. The amount of lead dissolved will depend on a number of factors including pH, water hardness and the standing time of the water.<sup>3</sup> Water that can cause leaching of materials is known as plumbosolvent water.

Lead is rarely present in New Zealand source waters; it is more common for it to appear in the water as the result of dissolution of materials within the reticulation network, or from the plumbing materials used in consumers' premises.<sup>4</sup> Lead is not routinely monitored in drinking water in New Zealand. Monitoring can be required if surveillance monitoring detects lead above a specified level (excluding lead due to consumer's plumbing) or there is knowledge of a lead source within the drinking water supply. There are no requirements to undertake the surveillance monitoring.

To avoid plumbosolvent waters being overlooked, and because of the nature of source waters in New Zealand, the assumption is made in the DWSNZ that all drinking-waters are plumbosolvent, in which case, water suppliers are to follow the requirements in section 8.2.1.4 of the DWSNZ. Section 8.2.1.4 of the DWSNZ requires water suppliers servicing more than 500 people to issue a notice every six months regarding flushing taps before use for drinking water. The notice must be a public notice published twice a year in the local newspapers and also a public warning to consumers provided at least twice a year, for example, included with the rate demand or water invoice.

Lead exposure via drinking water is of concern as it provides an additional route for ongoing exposure over time.

#### **3.2. Other sources of lead exposure**

Lead is the most common of the heavy metals and is mined widely throughout the world. It is (or has been) used in the production of lead acid batteries, solder, alloys, cable sheathing, paint pigments, rust inhibitors, ammunition, petrol, glazes and plastic stabilisers.

Approximately 80% of the daily intake of lead is from the ingestion of food, dirt and dust.<sup>3</sup>

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<sup>3</sup> NHMRC, NRMCC (2011) *Australian Drinking Water Guidelines Paper 6 National Water Quality Management Strategy*. National Health and Medical Research Council, National Resource Management Ministerial Council, Commonwealth of Australia, Canberra.

<sup>4</sup> Guidelines for Drinking-Water Quality Management for New Zealand, Chapter 10: Chemical Compliance – May 2019

### 3.3. Health considerations of lead exposure

Lead is a cumulative toxin, following exposure it is taken up into the various tissues of the body, including the bones, and is slowly released.

The primary concern with lead as a toxicant is from chronic exposure, particularly in children and the unborn foetus. Young children, infants, and foetuses are particularly vulnerable to lead because the physical and behavioural effects of lead occur at lower exposure levels in children than in adults. A dose of lead that would have little effect on an adult can have a significant effect on a child. In children, low levels of exposure have been linked to damage to the central and peripheral nervous system, learning disabilities, shorter stature, impaired hearing, and impaired formation and function of blood cells.<sup>5</sup>

Occupational exposure data provides guideline values for air quality, but diagnosis and action plans are purely based on determination of individual's blood lead levels. This recognises that exposure to lead throughout a lifetime is important and different exposure routes must be accounted for. There are well established clinical guidelines for chronic exposure to lead.

The Ministry of Health issues guidelines<sup>6</sup> for Public Health Units for the management of risks to health from exposure to lead in non-occupational settings. These guidelines outline investigation of potential sources of lead and how to reduce the exposure, the success of which is demonstrated by decreasing blood lead levels over time.

Under the Health Act 1956, lead poisoning is a notifiable disease to the Medical Officer of Health at blood levels >0.48 µmol/l. On 9 April 2021, the notifiable level will decrease to 0.24 µmol/l in recognition that impacts on children's neurocognitive development still occurs at lower levels. Research has not determined a level of lead below which there are no potential impacts on health, so any potential source of lead exposure should be reduced as much as possible.

### 3.4. Derivation of Maximum Acceptable Value for Lead

The Drinking Water Standards for New Zealand (DWSNZ) list the MAV for lead at 0.01mg/L.

The MAV for lead in drinking water is based on a World Health Organization assessment and was determined by the need to protect young children, infants and pregnant women, the groups most at risk. The value was determined as follows:

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<sup>5</sup> <https://www.epa.gov/ground-water-and-drinking-water/basic-information-about-lead-drinking-water>

<sup>6</sup> Ministry of Health. 2012. *The Environmental Case Management of Lead-exposed Persons: Guidelines for Public Health Units: Revised 2012*. Wellington: Ministry of Health.

$$0.01\text{mg/L} = \frac{0.0035 \text{ mg/kg body weight per day} \times 13\text{kg} \times 0.2}{1 \text{ L/day}}$$

1 L/day

where:

- 0.0035 mg/kg body weight per day is the lead intake which, based on metabolic studies with infants, does not result in an increase in lead retention.
- 13 kg is the average weight of a child at 2 years of age.
- 0.2 is the proportion of total lead intake attributable to water consumption. Sufficient data are available to indicate that 80% of intake is from food, dirt and dust.
- 1 L/day is the average amount of water consumed by a young child.

It is important to note that the MAV for most other chemical contaminants is calculated based on an adult weight of 70kg and a daily consumption of 2 litres.

### **3.5. Lead monitoring requirements in the DWSNZ**

Under the current DWSNZ, chemicals need to be formally assigned for monitoring. These are known as Priority two determinands and are assigned by DWAs for each drinking water supply. The assignment of Priority 2 determinands is based on short-term surveillance monitoring where contaminants are present at a concentration that exceeds 50 percent of the MAV. It is also based on knowledge of the catchment, treatment process and distribution system. There are no requirements to undertake the surveillance monitoring for lead.

In this incident, lead was not assigned as a Priority two determinand for DCC and it is unclear in the standards if there was a legal requirement for notification. It is also unclear if chemical exceedances in pre-flush samples or in raw water samples are required to be notified. However, DCC did have a water safety plan that required chemical exceedances to be notified.

The timeline below refers to all lead detections above the MAV as exceedances, not as transgressions, as it is outside of the scope of this report to make assumptions regarding non-compliance with the standards or the Health Act.

### **3.6. Timeline of the lead contamination event**

A brief timeline of the lead contamination event is shown below.

#### ***July 2020***

DCC Initiate testing to inform a corrosion monitoring strategy in alignment with their asset management strategy.

**First lead exceedance** 31/7/21 - Waikouaiti Golf Club of 0.0295 mg/L – results received by DCC and notified to PHS on 14/8/20.

### **October 2020**

**Second lead exceedance** 9/10/20 - Waikouaiti Distribution of 0.012mg/L – results not notified.

**Third lead exceedance** 30/10/20 - Karitane Bowls Club of 0.017mg/L (Pre-flush sample) - results not notified.

### **December 2020**

**Fourth and Fifth lead exceedance** 8/12/20 - Karitane Bowls Club (0.072mg/L) and Waikouaiti Golf Club (0.394mg/L). Result received 18/12/20. Notified 8/1/21.

Results from samples taken 18/12/20 and 22/12/20 all below MAV

**Sixth exceedance** 31/12/20 - Waikouaiti Golf Club of 0.0266 mg/L (pre-flush sample). Result received 15/01/21. Not notified.

### **January 2021**

**Seventh exceedance** 7/01/21 - Waikouaiti Golf Club of 0.0178 mg/L. Results received 15/01/21. Not notified.

8/01/21 - DCC notifies WCL of 8 December Waikouaiti exceedance via email. Eurofins confirms accuracy of sample result. DCC informed by WCL that additional and broader investigation is warranted.

11/01/21 – WCL informs PHS and MOoH of lead exceedance and requests public health input.

22/01/21 - DCC provide DWA and PHS with meeting agenda and updated sampling results. The updated sampling results provided include the exceedance for lead on 7 January in Waikouaiti Golf Club. WCL provide MoH a courtesy heads up about lead transgressions.

**Eighth exceedance** 20/01/21 - Raw water reservoir of 0.05 mg/L lead. This result was received by DCC on 29/01/21. Notified to PHS and WCL on 1/02/21.

### **February 2021**

1/02/21 - Medical Officer of Health contacts DCC staff member advising that a meeting is required to discuss Waikouaiti. DCC staff member notifies Medical Officer of Health of raw water reservoir result from 20 January 2021.

2/02/21 - MoH and MOoH PHS teleconference – Situation overview, Options for MOoH actions discussed, agreed people should stop drinking reticulated supply. DCC

Staff meet with MOoH, PHU Staff, and DWA-WCL. Medical Officer of Health advises DCC of the need to issue do not drink notice. Planning, logistics and communications were initiated. **Do not Drink notice issued at 3:15pm.**

4/02/21 – Decision made between MoH, Southern DHB and PHS to initiate community blood lead level (BLL) testing to support public health risk assessment as no preceding drinking water lead level testing. MoH Incident Management team established.

5/02/21 – First Community meeting to discuss lead event and BLL testing

9/02/21 – BLL testing commences.

To date (31 March 2021) – Lead exceedances continue to be found in the Waikouaiti water supply and the incident is not yet resolved.

### **3.7. Risk assessment for Waikouaiti water supply**

Ongoing exposure to lead levels above the recommended level through drinking water over a long period of time poses a health risk for communities, especially in children. Testing that had occurred since July 2020 showed intermittent spikes of high lead levels in some but not all samples. The source of the lead contamination (at the time of the risk assessment) was unknown. The duration of potential lead exceedances in the Waikouaiti water supply was also unknown as lead water sampling was not undertaken prior to July 2020.

A definitive public health risk assessment could not be ascertained from the drinking water sampling data alone. Individual sampling of blood lead levels (BLL) assists in determining whether there has been ongoing exposure to lead.

#### **3.7.1. Blood lead level testing**

Community BLL testing commenced on 9/02/21 – the next working day after BLL testing was announced. At the time of this report, 1519 BLL tests were performed (1342 in community clinics and 177 at general practices). Questionnaires were also completed by the community members being tested to help determine duration of exposure and other potential sources of exposure.

As previously noted, the notification level at which lead absorption is a notifiable condition under the Health Act 1956 is 0.48  $\mu\text{mol/l}$ . However a new notification level of 0.24  $\mu\text{mol/l}$  comes into effect on 9 April 2021. Any community members with blood lead levels at or above 0.24  $\mu\text{mol/l}$  were provided specialist health care advice and follow up in accordance with national guidelines which included source investigation and environmental risk assessment, and follow-up blood lead tests post source intervention.

The results from BLL testing for Waikouaiti, Karitane and Hawksbury community residents showed that people in these communities generally have blood lead levels below notifiable levels and in line with national data. Long term exposure to lead from the water supply seems unlikely. There were two results for children and 36 for adults above the notifiable levels. Assessments found alternative explanations for almost all these lead levels and health

officials are providing advice to these individuals. PHS consider that lead accumulation over time is the alternative explanation for many of the mildly elevated BLLs in those over 55 years of age.

PHS also undertook environmental testing in their source investigation of individuals with raised BLLs. Some of the household environmental results showed significantly elevated lead levels on indoor surfaces (e.g. floors, windowsills) or outdoor in soil. These results will be due to other sources of lead in the environment such as lead paint dust.

## 4. HEALTH RESPONSE

It is important to recognise that urgent public health decisions are often done with limited information to hand. This is very much the case with drinking water safety incidents. Public health experts and regulators must make decisions (or provide public health advice) based on what is known about the event at that given point in time and the potential for public health impacts. More often than not, a precautionary approach is taken.

Issuing a 'boil water' notice or a 'do not drink' notice has a major impact on a community and the decision to issue a notice is never taken lightly. The regulators, public health experts and water suppliers must consider this impact on the community versus the potential for acute or chronic harm. Early in events, the real potential for harm is often not fully understood, only estimated. Further information is usually required to form sound decisions, but this usually takes time to obtain. Hence, more often than not, an early precautionary decision is made until further information is available to inform next steps.

It is also important to note that the type of incident or event also influences the timeliness and appropriateness of the public health response. Contamination events involving microbiological parameters, such as the detection of *E. coli*, require a rapid response because of the potential for pathogens to cause acute and wide-spread harm to the community. Exceedances of chemical parameters usually allows more time to respond and gather further information such as more intensive sampling and analysis. This is because the Maximum Acceptable Values (MAVs) are based on consumption of two litres of drinking water per day over a lifetime (or 1 litre per day to represent a child's exposure as is the case for lead). Therefore, small or single exceedances rarely have an acute effect on the health of the community, and will only have an impact on health if the exceedance is sustained for a long time.

It is always easy to look back with hindsight to determine if decisions were timely and appropriate. Care has been taken with this review to consider all health responses to this event, based on the information that each party had to hand at the time of the response.

### 4.1. Wai Comply

Wai Comply are contracted by the Ministry of Health to provide drinking water assessment functions for a select number of drinking water suppliers throughout New Zealand. This includes Dunedin City Council. Wai Comply are the first independent organisation to be accredited by the Ministry of Health as a national drinking water assessment unit. The contract to undertake drinking water assessment functions for Dunedin City Council water supplies commenced on 1 September 2020, after the first lead exceedance. Whilst Wai Comply do not directly provide health advice, they are still an important part of the overall health response, as are DWAs in general. They are the first to respond to incident notifications and the first to determine when, and if, an incident or issue requires escalation to a Designated Officer or a Medical Officer of Health.

Wai Comply had several meetings with DCC from September to December 2020 to provide clarity on their role as drinking water assessors and confirm notification requirements. Wai Comply also met with Public Health South to agree roles and responsibilities. It was

determined that laboratory notifications relating to DCC water supplies would remain with PHS to be immediately forwarded to Wai Comply, to avoid confusion for the laboratory as PHS continue to provide drinking water assessment functions for other drinking water suppliers in the district.

Wai Comply did not receive notification of any lead transgressions until 8 January 2021. This notification was for the 8 December 2020 exceedance in Waikouaiti only and was received via email. This email also advised that additional samples taken after 8 December were below the MAV for lead.

Wai Comply confirmed with DCC that this is a chemical transgression and agreed with the steps being taken by DCC and also highlighted that additional and broader follow up was warranted. The accuracy of the 8 December sample result was reviewed and DCC provided written confirmation from Eurofins that the sample results were accurate.

Wai Comply informed PHS of the lead transgression on 11 January 2021 and requested public health input. Wai Comply continued to liaise with PHS and DCC to obtain clarification of results and advise on further investigative requirements. On 22 January, DCC provided Wai Comply with updated and corrected sampling results which demonstrated that other non-notified lead exceedances had occurred. Wai Comply then provided the Ministry of Health a courtesy 'heads up' that they were following up a number of lead transgressions in a Dunedin supply.

On 27 January, Wai Comply and PHS met with DCC to address the subject of lead in the Waikouaiti supply. Immediate actions such as increased sampling, catchment risk assessment, and potential for public communications were raised. DCC agreed to develop a sampling plan and provide this to Wai Comply and PHS by 5 February 2021.

On 1 February 2021, DCC reported a lead exceedance in the raw water reservoir sample taken on 20 January. This exceedance was the first indication that lead contamination may be from an environmental source rather than from DCCs water infrastructure, and as such, elevated the level of urgency with this event. A meeting between DCC, Wai Comply and PHS was scheduled for the following day. On 2 February, DCC was advised by the Medical Officer of Health that a 'do not drink' notice was required.

The reviewers consider that the actions of Wai Comply were timely and appropriate, based on the information provided to them from DCC and the timeframes in which that information was provided. The lead transgression was escalated to PHS in a timely manner. The advice given to DCC regarding further investigations of the lead exceedance was sound and timely, considering the limited information Wai Comply had at that point in time. Wai Comply followed their internal procedures for incident management and the reviewers have not identified any specific improvements to their operational processes that could improve public safety and reduce risk to health and wellbeing.

## 4.2. Public Health South

The DWA at PHS was first notified of a lead exceedance in August 2020. The DWA sought advice from ESR regarding the appropriateness of the monitoring program that DCC was undertaking as part of their corrosion monitoring strategy. A public health risk assessment was not sought at this time following notification of the single exceedance. There was no discussion between the DWA and DCC about notification of any adverse findings arising from this monitoring program. It was assumed by the DWA that any further exceedances would be notified. This assumption is not unreasonable considering that the first exceedance was notified.

PHS was not notified of any other lead exceedances until the 11 January 2021 when informed by Wai Comply of the 8 December 2020 exceedance. The first indication that this exceedance was not a singular exceedance was received on 22 January 2021 and again on 1 February 2021.

Between 11 January and the 2 February, PHS sought additional information from DCC including clarification of results, and technical public health risk advice on lead exposure from ESR. The intermittent nature of the lead exceedances made it difficult for ESR to provide a definitive risk assessment.

On 2 February 2021, PHS sought formal advice from ESR for a public health risk assessment of potential acute and chronic lead toxicity. A written response from ESR on 5 February 2021 advised that a single exposure of a child at the highest concentration (0.394 mg/L) should not pose an immediate health risk if the child has a low background BLL. However, this was only a risk estimate and a definitive risk could not be ascertained without individual sampling of BLLs.

The reviewers consider that the advice to issue a 'do not drink' notice on 2 February was timely and appropriate. The decision to undertake BLL screening of the community on 4 February was also timely and appropriate. The roll out of BLL screening in the community was extremely efficient and fast, with the testing commencing the next working day (on 9 February 2020) after it was announced to the community (on 5 February 2020). PHS, Southern DHB, WellSouth (the local Primary Health Organisation), the Ministry of Health, the Waikouaiti Community Board and Kati Huirapa Runaka ki Puketeraki should be commended for their efforts in the establishment and roll out of community BLL screening.

The Chair of the Community Board and the CEO of DCC have both expressed extreme satisfaction in the response by PHS to this event. Both parties have expressed to the reviewers that public communications and advice provided by PHS was timely, responsive and presented in ways to be easily understood by the community. Questions arising from the community that could not be answered immediately, were noted and responded to quickly and efficiently and in a way that could be understood by all. The reviewers consider that public engagement and public communications throughout this event were timely and appropriate, given when sufficient information was available to health agencies to undertake a health assessment.

PHS followed their internal procedures for incident management and the reviewers have not identified any specific improvements to their operational processes that could improve public safety and reduce risk to health and wellbeing.

PHS have advised the reviewers that during the lead up to the issuing of the 'do not drink' notice they experienced some difficulty in accessing immediate expert advice. Whilst they were able to obtain expert written advice from ESR, the process of filling out forms to obtain this advice was somewhat frustrating and time-consuming even though they appreciate that it was necessary. They felt that access to public health engineers, toxicologists, etc would have been good if available for quick advice or to bounce ideas and/or concerns off. Both Medical Officers of Health at PHS reported undertaking their own literature searches and research, including estimating public health risk from lead in drinking water in order to have a better understanding of the situation they were dealing with.

### **4.3. Ministry of Health**

The Ministry of Health was first officially notified of the lead exceedances in Waikouaiti on 31 January 2021. The Ministry of Health was a sounding board for PHS on public health matters concerning the event, including the issuing of the 'do not drink' notice and the decision to undertake BLL testing.

The Ministry of Health provided full support for PHS in the decision to undertake BLL testing. An Incident Management Team (IMT) was established on the 4 February 2021 to support PHS with the health response and ensure the availability of free BLL testing. It is interesting to note that the health sector response to COVID-19 provided a good platform to draw on for this rapid response for BLL testing.

At the time of this report, the lead issues in Waikouaiti are still ongoing and the IMT has not been stood down. The Ministry continues to provide Situation Reports and continues to support PHS and the DWAs as required.

The reviewers consider the overall response from the Ministry of Health was timely and appropriate and have not identified any specific improvements to their operational processes that could improve public safety and reduce risk to health and wellbeing.

## 5. OTHER FINDINGS AND RECOMMENDATIONS

This event has highlighted aspects of the current and proposed regulatory regime that could be improved.

### 5.1. Reporting of transgressions

It is quite clear from this event that reporting of exceedances of MAVs by both the Council and the laboratory hindered the timeliness of the health response. Section 69ZZ of the Health Act 1956 requires laboratories to report non-compliance with MAVs to the Director-General of Health. The DWSNZ does not give clear guidance to water suppliers on reporting of chemical transgressions other than for chemicals designated as Priority 2 determinands (see section 5.2 below).

Within the Council, there was separation of sampling results from the asset management monitoring project, with sampling results from routine drinking water compliance monitoring which resulted in the extreme delay of notification to WCL and PHS of the exceedances. Although this has been rectified by Council, it is quite unfortunate as any sampling program, regardless of purpose, has the potential to inform drinking water suppliers of potential hazards and risks to the ongoing provision of safe drinking water.

The Water Services Bill provides an avenue for clearer instructions to drinking-water suppliers and laboratories on reporting of transgressions and actions that must be taken (Sections 22, 35 and 72). In the meantime, drinking-water suppliers should be encouraged to review their internal communications to ensure that all sampling results, regardless of type of sampling program, are reviewed and collated in a manner that will ensure adverse findings can be reported and acted on immediately. Drinking-water suppliers should also be encouraged to discuss any planned research or monitoring projects with their DWA and agree up front how and when adverse findings will be reported.

**Recommendation 1:** The Director-General write to all accredited laboratories to remind them that all exceedances in drinking water samples, regardless of the purpose of the sampling, must be reported to him in accordance with Section 69ZZ of the Health Act.

**Recommendation 2:** The Director-General write to all registered drinking-water suppliers to:

- Advise them that all exceedances of any chemical contaminant must be reported to their DWAs;
- review their internal communications to ensure that all sampling results, regardless of type of sampling program, are reviewed and collated in a manner

that will ensure any adverse findings can be reported and acted on immediately;  
and

- encouraged to discuss any planned research or monitoring projects with their DWA and agree up front how and when adverse findings will be reported.

**Recommendation 3:** Taumata Arowai provides clear instructions, procedures and notification forms for incident and event notification, to all registered suppliers prior to going live. This should include explicit detail on what needs to be reported, when it needs to be reported, how it needs to be reported and who it needs to be reported to. Taumata Arowai should also remind suppliers of requirements under the new Act (when enacted) that corrective, investigative, and remedial actions must be taken and be clear on their expectations regarding timeliness and appropriateness of these actions.

## 5.2. Current Standards

The requirements in the DWSNZ for chemical monitoring and reporting of exceedances is unclear. Section 8.4 provides information about reporting of MAV exceedances and remedial actions required. However, this section refers to Priority 2 determinands only. The DWSNZ is silent on reporting and required remedial actions of MAV exceedances of other chemical contaminants that have not been deemed Priority 2 determinands by a DWA for an individual water supply. This is most likely due to drinking-water suppliers not being required to monitor for contaminants that have not been deemed as Priority 2.

The assignment of Priority 2 determinands is based on short-term surveillance monitoring where contaminants are present at a concentration that exceeds 50 percent of the MAV. It is also based on knowledge of the catchment, treatment process and distribution system. The assignment of Priority 2 determinands may not necessarily align with a risk-based monitoring program developed through a water safety plan. Contaminants of concern may be present in concentrations below 50 percent of the MAV but should be regularly monitored anyway. Additionally, there may be emerging contaminants of concern within the catchment or the water supply that should be regularly monitored even if they are currently below any detection limit.

Exceedance of a MAV may not necessarily result in non-compliance with the DWSNZ. The standards allow a number of exceedances based on total number of samples taken that gives 95% confidence that the benchmark is not being exceeded more than 5 percent of the time. It does not take into consideration the actual concentration of the contaminant and the extent of the exceedance. Therefore, unsafe drinking water can still be compliant with the standards. A much better measure of compliance to standard would be to use a rolling

annual average. It will give a much better indication of long term safety of the drinking water. However, any exceedance of a MAV should still be reported to the regulator as an incident requiring investigation and remedial action.

The Water Services Bill allows for a thorough review of the current standards. The standards will be for minimum or maximum acceptable values for chemical, radiological, microbiological and other characteristics of drinking water only (Section 46). Compliance rules will be used to set out requirements relating to the performance of functions or duties of drinking water suppliers (Section 48). Care will need to be taken to ensure that the proposed compliance rules focus on performance outcomes rather than prescriptive requirements and support the risk management approach in water safety planning, including risk-based monitoring.

**Recommendation 4:** The Director-General sets out clear expectations to registered drinking water suppliers on reporting and remedial actions that must be undertaken when a chemical exceedance occurs, even if that chemical has not been allocated as a Priority 2 determinand.

**Recommendation 5:** Taumata Arowai considers the limitations of the current standards when developing new standards and compliance rules, particularly the processes to demonstrate compliance, the processes to determine appropriate monitoring programs and the specific requirements for notification of incidents. Care will need to be taken to ensure that the proposed compliance rules focus on performance outcomes rather than prescriptive requirements and support the risk management approach in water safety planning, including risk-based monitoring.

### 5.3. Duty of care of drinking-water suppliers

The overarching duty of care of suppliers to consistently provide safe drinking water is not clearly articulated in the Health Act nor the DWSNZ. Currently, the water industry focus is on compliance to standards rather than the ongoing provision of safe drinking water. This lead event (and other recent events in New Zealand) has highlighted that compliance to the standards does not necessarily mean that drinking water is safe. Conversely, non-compliance with standards does not necessarily mean that drinking water is unsafe.

The duty of care of suppliers is more clearly articulated in Water Services Bill, as is the requirements and importance of water safety planning and risk management.

There is concern that this event may discourage drinking water suppliers to undertake any research-based or surveillance monitoring. Suppliers should be encouraged to assess the risk of lead leaching from their infrastructure as part of their risk assessment process in their

water safety plans and where necessary instigate a monitoring program and a plan for responses to unfavourable or unexpected results with potential health significance.

**Recommendation 6:** The Director-General sets out clear expectations to registered drinking water suppliers that the overarching ongoing provision of safe drinking water through water safety planning and risk management is as important as compliance to the standards, and that compliance to standards does not necessarily demonstrate the ongoing provision of safe drinking water. Suppliers should assess the risk of lead leaching from their infrastructure as part of their risk assessment process in their water safety plans and where necessary instigate a monitoring program and a plan for response to unfavourable or unexpected results with potential health significance.

#### 5.4. Public Health Risk Assessments and Responses

This event has highlighted the need for DWAs and public health units to have access to expert public health advice in a timely manner. Whilst some expert advice was available, the process to obtain the advice was time-consuming. It is unclear if the provision of expert advice could have been expedited in this case, however, it is an important aspect of incident management to note going forward. Whilst a precautionary approach is often undertaken at the beginning of an event, there is often a high level of community concern and need for further information about the potential or real health effects of incidents to be provided in a timely manner. This is understandable.

Both DCC and PHS reported some confusion with roles and responsibilities of individual parties (including Wai Comply) in this event. Whilst this issue was dealt with early on in the event, it does highlight that roles and responsibilities during any drinking water incident should be well understood beforehand.

This was the first major incident in which the drinking water assessors were not part of the public health unit. This incident is likely to represent how incidents will be managed in the future once Taumata Arowai is the active regulator. That is, the regulator may not have public health expertise and will have to work closely with public health units during incidents in which a public health response is required. Conversely, the public health unit will not have access to key water safety planning information that may be relevant to the management of the incident or event. Additionally, Taumata Arowai may need to draw upon public health risk assessment expertise within public health units to review the adequacy of drinking water suppliers responses to drinking water incidents from time to time.

**Recommendation 7:** The Ministry of Health review the process for PHUs to access expert public health advice for urgent drinking water matters with a view to expediting the process to ensure timely access to expert advice and consider other possible avenues for the provision of additional expert advice.

**Recommendation 8:** Taumata Arowai will need to have clear roles and responsibilities established with DHBs and PHUs for managing incidents and events where there is known or potential risk to public health. (e.g. a public health risk assessment is required and/or the event requires possible public health intervention or management such as during outbreaks). This includes agreed protocols for the timing and breadth of information sharing both ways.

**Recommendation 9:** When developing databases for information management, Taumata Arowai should consider how to ensure that all relevant information about any drinking water supply or drinking water supplier can be accessed in a timely manner and provided to relevant parties during incidents and events.

## 5.5. Community engagement and transparency

Both the Chair of the Community Board and the Runaka Manager expressed deep appreciation for the timeliness and manner in which PHS and DCC engaged with them and the community. They both feel that the health response was excellent. It was mentioned that early on in the event, transparency of monitoring results and what was being done to investigate the exceedances was an issue. Although this was remedied quickly by DCC, it is worth mentioning that transparency is an essential part of community engagement, even if the information or data is disappointing or unfavourable. Transparency of results will also need to be accompanied by public health advice regarding any action a potentially exposed person would need to take.

The Water Services Bill provides for possible transparency of monitoring results via section 38 – ‘*Requirement for supplier to provide information to consumers and have a complaints process*’. There is opportunity for Taumata Arowai to ensure that drinking water suppliers disclose or publish their monitoring results to consumers on a regular basis through regulations. The reviewers consider that ongoing transparency of monitoring results and other information is a very important aspect of a supplier’s responsibility to their consumers in supplying safe drinking water and meets a need that annual reporting by the regulator cannot.

It is important that drinking water risks are not treated differently from other environmental health risks. As an example, the response in a number of regions to recreational water microbiological exceedances, is for the information to be publicly available in close to real time. This enables the community to make an informed choice about exposure. Access to publicly available near real-time monitoring data, can also be utilised by the Public Health Units to manage potential environmental risks.

Communities require a collaborative approach from all agencies with roles and responsibilities to respond to possible public health risks such as a drinking water safety issue. It is important that all agencies with potential roles in provision of drinking water are included in a response and each agency is clear regarding their role. An example for the current response was the need to have the Ministry of Primary Industries present for their role in domestic food safety and animal health. This further reinforces Recommendation 7 for Taumata Arowai to clearly outline roles and responsibilities for agencies involved with drinking water safety.

**Recommendation 10:** Taumata Arowai consider ongoing disclosure and transparency of monitoring results and other relevant information when developing regulations for Section 38 of the Water Services Bill.

## 5.6. Lead in taps

In New Zealand, household tapware and pipe fittings containing lead are still being imported and widely used. Whilst the source of the lead contamination in Waikouaiti is still under investigation, it is clear that lead in tap fittings and plumbosolvency has been a concern in New Zealand for many years. Hence, the general health advice to run taps prior to using tap water if it has been sitting for a period of time.

The United States has moved to a zero-lead benchmark for tapware and we understand that Australia is considering moving the same way. The current standards in New Zealand have an allowable lead level. This event has triggered calls for tougher rules for home plumbing and has been a recent topic for discussion in the media.<sup>7</sup> It is out of scope of this review to provide recommendations on plumbing standards, however, it is sensible to recommend that a review of plumbing standards is undertaken. Considering the results of the environmental samples taken during this event, every opportunity to reduce lead exposure by any pathway should be carefully considered.

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<sup>7</sup> <https://www.tvnz.co.nz/one-news/new-zealand/calls-tougher-rules-around-home-plumbing-after-lead-contamination-in-drinking-water-v1>

**Recommendation 11:** The Ministry of Health, Taumata Arowai and other relevant parties undertake a review of the current plumbing standards specifically to consider the implications of allowable lead levels in imported tapware and fittings and whether the current standards are sufficient to ensure public health is protected.

**Recommendation 12:** The Ministry of Health review the requirements for drinking water suppliers for managing plumbosolvency, specifically any advice or templates provided to suppliers. The Ministry should ensure that notifications to consumers by suppliers includes information on, or links to, resources on reducing exposure to other sources of lead in households or the environment.

## 6. CONCLUSIONS

Although the lead contamination event in Waikouaiti is ongoing, the public health response to date has been timely and appropriate. Internal procedures within the Ministry of Health and Public Health South were followed and ensured excellent management of this event. No legislative levers or powers were required or used at the time of this report. DCC have been proactive in undertaking internal changes to enable timely reporting of exceedances and are taking steps to replace piping that may have contributed to this event.

This review has not been able to identify any specific improvements for WCL, PHS or MoH in the management of this incident. It has however identified a potential issue with timely access to technical expertise during incidents for the MoH to consider. This lead contamination event has required a strong interagency and multidisciplinary approach with a particular focus on risk communication expertise. In this case, risk communication by PHS has been excellent.

This review has identified several areas in the current and proposed regulatory framework where improvements could be made and puts forward 12 recommendations for the Ministry of Health and Taumata Arowai to consider.