

**Guideline for Sampling and Testing of Water
associated with Monitoring of Aerial 1080 Baiting
Operations (3rd edition)**

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1. Introduction

The risk of potential contamination of New Zealand water supplies by 1080, particularly following aerial application of baits for pest control, has been addressed by research on the environmental effects and degradation of 1080 in water (e.g. Eason et al. 1992, 1993; Ogilvie et al. 1996; Booth et al. 1999; Eason & Wright 2001; Fisher et al. 2003; Suren 2006). Landcare Research maintains a database of the results of almost 3400 water samples tested by the Toxicology Laboratory for 1080 contamination since 1990. Of the samples tested, 2.9% (98) of the samples contained detectable 1080 residues and in most of them (90) the 1080 concentration measured was less than 1 ng/mL (parts per billion). There is no evidence that drinking water has been contaminated and the extensive research and monitoring in catchments treated with 1080 indicates that this is highly improbable if current safety procedures are followed.

If 1080 were somehow to get into drinking water supplies the Ministry of Health recommends that water should not be used for drinking until tests show that the concentration of 1080 is below 2 ng/mL (<http://www.moh.govt.nz>). The Drinking Water Standards for New Zealand (MoH 2005) require that, should residues be detected at more than 50% of the maximum acceptable value (MAV), additional water sampling should be undertaken and continue until it has been established that residue concentration does not exceed the MAV. The figure of 2 ng/mL is an approximation of 50% of the provisional MAV of 3.5 ng/mL.

This document provides general technical advice for agencies undertaking water monitoring after aerial 1080 baiting operations, such as the Department of Conservation, regional or unitary council pest control managers, or Medical Officers of Health (MOH) who are involved in assessing the need for sampling.

2. Sampling Strategies

2.1 Why test water for 1080?

Each aerial 1080 poisoning operation requires approval by the MOH, and in some cases the regional council (under the Resource Management Act 1991). Water monitoring may be requested by any of these agencies, although it is usually the MOH who makes the request where water from the area is used for human consumption, i.e. potable water. Different testing regimens are required to meet different needs. Crown Research Institute (CRI) researchers have in the past undertaken water monitoring to determine if they can find any 1080 residues in small streams in the heart of catchments after aerial application or after deliberately ‘spiking’ streams with baits to address questions relating to the breakdown of bait, duration of contamination, and distance that residues travel (Suren 2006). Research questions often require intensive sampling regimens different from the sampling requirements associated with the need to define whether or not 1080 residues are present in drinking water.



2.2 Where to take samples

The number of sampling sites for water monitoring will be dependent on the questions being addressed, the nature of the terrain, the surrounding land use, and the presence of domestic water supplies in the area. Because each area is different, the selection of sampling sites will be specific to each operation.

If sampling is focused on determining the presence or absence of residues in drinking water, samples may be taken from:

- The watercourse immediately upstream of the point where water is withdrawn to provide a potable water supply for drinking
- Pipeline water at treatment stations – after the treatment point
- Rain tanks for private domestic supplies or from streams directly above the draw-off pipe for a local supply.

2.3 When to take samples

In all instances, appropriate sampling intervals and frequency should be confirmed with the regional council hydrologist, whose advice should be sought when designing the water monitoring programme.

It is important to ensure that sampling is undertaken during the most likely time period for occurrence of 1080 in waterways. Previous monitoring data suggest that most water samples with detectable concentrations of 1080, and certainly the ones that have been above 1 ng/mL (part per billion), were collected within 48 hours of aerial bait application. Research by Suren (2006) showed that 1080 was rapidly leached from pellet baits placed in small streams (>90% of 1080 leached within 24 hours), and 1080 was detectable in the water for a short period of time.

Water samples taken within 8 hours of bait application are expected to provide the greatest likelihood of detecting any residual 1080. Ideally, sampling from the same relevant point on a waterway at 8 hours and again at 24 hours after bait application will be useful to confirm whether or not 1080 is present in detectable concentrations.

2.4 Sampling mechanisms

Samples should be taken, whenever possible, 30 cm below the water surface. Sample bottles should be rinsed two or three times in the water source before collecting the sample. However, this practice should not be used when the sample comes from rivers or streams with high contents of suspended solids.

3. Requirements for Sampling

3.1 Sample handling

Because 1080 is known to degrade in biologically active stream water more rapidly at higher temperatures (Parfitt et al. 1994; Ogilvie et al. 1996), water samples should be analysed as soon as practicable and kept frozen until analysis to ensure that any 1080 in the sample does not degrade. Since 1080 is an ionic compound, plastic sample bottles should be used and these need to be able to withstand freezing to -20°C . Sample bottles can be obtained from plastic wholesalers or from



pharmacies. Each sample should be at least 200 mL in order to provide sufficient water for repeat testing; sample bottles should be no more than 80% full to allow for expansion when freezing.

- Samples should be frozen as soon as possible after collection if they are not to be tested within 24 hours.
- Urgent samples for 24-hour turnaround testing may be sent unfrozen to the testing laboratory, but they must be chilled to 4°C and placed on ice as soon as possible after collection.
- Samples should be stored at a temperature as close to –20°C as practical and certainly below 0°C and sent to the laboratory as soon as practical after collection.

3.2 Sample integrity

It is vital that water samples are taken from each site in a way that ensures that samples are not contaminated by the sampler, sample containers, or subsequent handling.

The limit of detection in water samples for the testing method is some 15 million times lower than the typical concentration in possum baits (the method limit of detection is 0.1 ng/mL (ppb)). Hence the method for testing the sample is extremely sensitive and even minute amounts of 1080 will be detected. Sample containers must not therefore become contaminated in any way, even externally.

- Containers must be absolutely clean and thoroughly flushed inside and out several times with water during filling.
- No 1080 bait or other contaminated material, such as bait containers, should be in vehicles used in the transport of water samples.
- It is essential to isolate the process of sample collection from the poison operation and the personnel involved in it.

3.3 Sample description

Since 1990, an extensive and valuable database of results of water monitoring of 1080 poison operations has been compiled by the Landcare Research Toxicology Laboratory (Booth et al. 2007). To ensure the continued utility of the database it is important to include the following information for each batch of water samples submitted for analysis:

- Definitive name for the area of the operation and map reference (GPS) for the treatment area
- Date for the start of the operation
- Bait type and concentration of 1080 (e.g. 0.08% or 0.15%)
- Sowing rate
- Number of samples taken before poisoning
- Number of samples taken from the treatment area after poisoning
- Number of samples taken from the treatment area after a significant amount of rainfall, e.g. 25 mm
- Number of samples taken from drinking water supplies

To assist in providing this information, a sample form is included on the last page of this protocol. In 2007 The Environmental Protection Authority (previously The Environmental Risk Management Authority established the 1080 Watchlist which is a database for reporting to the Authority after an aerial 1080 control operation. This complies with Control 12 of the formal decision of the 1080 reassessment completed in August 2007 (ERMA 2007).



4. Testing Procedures

On receipt of samples, they will be entered on the laboratory sample register and placed in a freezer at -20°C and analysed as soon as possible. Testing is usually completed within 7 working days. However, confirmation that potable water is free of 1080 is often required promptly. Hence a **24-hour service** for critical samples is also offered for which the following are required:

- Notification 1 week in advance for possible samples
- Warning of 1 day before sample arrival
- Samples must be received at the laboratory by 10.30 am. on the day of testing
- The service will be available on a Friday only if a client representative will be available on Saturday to receive results
- No more than 10 samples can be tested on a 24-hour basis

Results will be available no later than 9.30 a.m. on the following day.

Testing is carried out using the gas chromatography method TLM005, 'Assay of 1080 in water, soil, and biological materials by GLC'. This method was developed by Landcare Research, Lincoln, based on the work of Ozawa & Tsukioka (1987, 1989). This method is accredited with IANZ (International Accreditation New Zealand) under Environmental Monitoring.

Any fluoroacetate in the water sample is acidified with hydrochloric acid and converted to the dichloroaniline derivative by using N,N'-dicyclohexyl carbodiimide (DCC) and 2,4-dichloroaniline (DCA). The derivative is cleaned on a silica solid-phase extraction cartridge, eluted with toluene, and quantified by gas chromatography with electron-capture detection. The limit of detection is 0.1 ng/mL in a 50-mL water sample.

An IANZ-endorsed laboratory report will be provided to the client on completion of the work.

5. Transport Requirements

Water samples should be transported frozen to the testing laboratory (this is not necessary for 24-hour turnaround, but samples must be chilled and kept on ice). This is best accomplished by couriering a set of samples wrapped as a package with insulating material, as the bulk of the frozen material helps to maintain the low temperature of the sample sent.

Samples are to be sent to:

Lynn Booth
Toxicology Laboratory Manager
Landcare Research
Gerald Street, Lincoln 7608
Phone: 03 321 9617; Fax: 03 321 9998



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Samples should be sent by courier door-to-door to arrive on a working day only. Please note samples cannot be received over the weekend. To ensure timely turnaround of urgent samples (24-hour turnaround), advance notice is required in ALL cases.

6. Prices

6.1 Analysis for 1080

The method for testing for 1080 in water requires extensive work to reach the quoted limits of detection. In order to promote larger, more effective monitoring programmes and to take advantage of the efficiency of processing large numbers of samples, a graded scale of fees dependent on sample numbers has been set. Prices as at 1 January 2016 are as follows:

Standard rate

1–3 samples	\$308 per sample
4–6 samples	\$246 per sample
>6 samples	\$215 per sample

24-hour service

1–3 samples	\$460 per sample
4–6 samples	\$370 per sample
>6 samples	\$322 per sample

These prices are exclusive of GST and are subject to change. For larger numbers of samples please contact Lynn Booth (03 321 9617), who may negotiate reduced prices dependent on the number of analyses.

7. References

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1080 WATER SAMPLE DETAILS

Client details

Contact name:.....
Organisation:.....
Address:.....
Phone:..... Fax:.....
Date sample sent:.....

Operation details

Definitive name for treatment area:.....
Map reference: NZMS 260:..... Grid reference:.....
Date of operation:.....

Poisoning

Bait type (e.g. 0.15% cereal):.....
Sowing rate (kg/ha):.....

Sampling

Number of samples taken before operation:.....
Number of samples taken from the treatment area after poisoning:.....
Number of samples taken from the treatment area after a significant rainfall, e.g. 25 mm:.....
Number of samples taken from drinking water supplies:.....

Please return to:

Lynn Booth
Toxicology Laboratory
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Gerald Street
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Fax: 03 321 9998

Sample results will be included in the 1080 water monitoring database.



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