

B6.1

Monitoring pest control industry workers for occupational exposure to 1080

A guideline for employers | March 2011



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DISCLAIMER:

This document is intended as a guide for employers who seek to establish and maintain the minimum requirements for a routine monitoring program in order to identify and minimise occupational exposure of their employees to the vertebrate toxic agent 1080. It is not a replacement for legislative requirements of the Health and Safety in Employment Act, and should be used a supplement to other available documents listed in Section 8, 'Further Information' of this document. While every care has been taken to ensure it is accurate, the information contained in this report is not intended as a substitute for specialist human or environmental health and safety advice. NPCA accepts no liability for loss or damage suffered, either directly or indirectly, as a result of relying on or applying the information in this report.

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CONTENTS

1. PURPOSE	2
2. COMPANION DOCUMENTS	2
3. INTRODUCTION	3
4. WHO SHOULD BE MONITORED?	3
Consent	
Confidentiality & availability of monitoring results	
5. HOW TO MONITOR	4
6. WHEN AND HOW OFTEN TO MONITOR	6
7. CONSEQUENCES OF DETECTING 1080	7
8. FURTHER INFORMATION:	8
9. GLOSSARY OF ABBREVIATIONS	8
Appendix One: Example Consent Form	9
Appendix Two: Example Employee Track Record Form	10
Appendix Three: Urine Sample Submission Form	11
Appendix Four: Price List for Analysis of 1080 in Urine Samples	12

Note: This is an updated edition

This 2011 edition of the guideline is an update of the earlier October 2008 edition. The main changes are:

- additional guidance on timing added on page 4 under 'Obtaining the samples', Section 5;
- guidance on timing amended and moved to page 4 (previously under 'Recommended additional monitoring', Section 6)
- updated cross references to further information
- updated prices in Appendix 4.

1. PURPOSE

The Health and Safety in Employment Act (1992 and Amendments) requires that when there is a significant hazard that cannot be eliminated or isolated, an employer must, in addition to minimizing the hazard, monitor the exposure of the employee to the hazard.

This document has been published to assist employers in the animal pest control industry to meet their obligation to monitor employees or contractors for occupational exposure to the vertebrate pesticide, sodium fluoroacetate (1080), by providing:

- background information, and
- guiding procedures for implementing an employee monitoring program.

Monitoring for occupational exposure to 1080 is important to confirm that current work practices and equipment used to handle 1080 are effectively protecting employees, and to enable the rectification of personal protective equipment (PPE) and practices that may not provide adequate protection.

In 2002, The Occupational Safety and Health Service (OSH) adopted a Biological Exposure Index (BEI) for 1080 in urine of 15µg/L (*Workplace Exposure Standards Effective from 2002*, Occupational Safety and Health Service, Department of Labour). Monitoring for 1080 exposure is most easily carried out through testing urine samples for the presence of fluoroacetate and referencing the results to the BEI. There are currently no well-accepted biological effect monitoring strategies available to assess human health risks from 1080 exposure – so the emphasis of this guideline is on establishing and maintaining minimal exposure in the workplace.

2. COMPANION DOCUMENTS

This document should be used in conjunction with other available publications listed in Section 8, 'Further Information' (with Internet links), including;

- *Toxic Agents, Minimum Requirements for Safe Use and Handling*. National Possum Control Agencies, 2006.
- *Legislation Guide, User Guide to Legislation relating to Vertebrate Pest Control*. National Possums Control Agencies, 2010.
- *Guidelines for the safe handling and use of sodium fluoroacetate*, Occupational Health and Safety Service, Department of Labour, 2002
- *Workplace Exposure Standards Effective from 2002*, (includes Biological Exposure Indices for New Zealand) Occupational Health and Safety Service, Department of Labour

Where handling of vertebrate pesticides is required for the purposes of the Department of Conservation (DOC), this guideline should also be used in conjunction with Standard Operating Procedures (SOPs) set out by DOC for employees and contractors, alongside a health and safety plan that defines standards for appropriate personal protective equipment (PPE) and handling procedures.

3. INTRODUCTION

This document provides a practical guideline for undertaking monitoring of employees for occupational exposure to the vertebrate pesticide, sodium fluoroacetate (1080). It is one of the wide range of hazardous substances (as classified under the Hazardous Substances and New Organisms Act (HSNO)) that may be present in some workplaces, to which workers may potentially be exposed,

The extent and methods of 1080 application in New Zealand are internationally unique, and raise ongoing community and scientific concerns about possible adverse effects on human and environmental health. Acute toxic effects in humans from intentional (or, rarely, inadvertent) ingestion of 1080, or from exposure to very high dust levels have been described, but much less is known about the effects of sub-lethal or long-term exposure. There have been no direct investigations that link adverse health outcomes in humans to sub-lethal 1080 exposure. However, from studies of the effects of sub-lethal exposure in animals, it is assumed that any human exposure to 1080 should be regarded as a hazard and avoided wherever possible or, at least, kept to a level deemed acceptable through a risk assessment approach.

Potential routes of exposure and absorption of 1080 in occupational situations include inhalation, skin contact and inadvertent ingestion. All work activities involving the manufacture, handling, storage, application and disposal of formulations containing 1080 should be regarded as a potential hazard to personnel directly involved in these processes or working in close proximity to areas where they are carried out. Certain tasks in 1080 operations are considered to have greater potential than others for worker exposure to 1080, and these are discussed more fully in Section 4. Implications of monitoring results where fluoroacetate (the active component of 1080) is detected in urine samples are more fully discussed in Section 7.

4. WHO SHOULD BE MONITORED?

All employees or subcontractors who undertake duties involving the manufacture, handling, storage, application and disposal of formulations containing 1080 should be included in a monitoring program. Remember that personnel from multiple employers can be on-site and at risk of exposure – particularly during aerial baiting operations, e.g. drivers transporting baits, pilots and ground crews, representatives from vector control agencies. Any employer with staff in such roles should use these guidelines.

The minimum recommended requirements for an effective monitoring program are outlined in Sections 5 and 6 below.

However, employers also need to consider more targeted monitoring of individual workers who either frequently carry out duties that could expose them to 1080, and/or have specific tasks with a relatively high risk of exposure, e.g.

- handling liquid concentrates of 1080;
- close contact with 'wet' 1080 baits, particularly carrot baits, during mixing or loading;
- loading 1080 baits into helicopter hoppers.

Individual workers may require additional monitoring, over and above the minimum requirement outlined in Sections 5 and 6, when indicated by the outcome of previous monitoring (see Section 7, 'Consequence of Detecting 1080').

Monitoring should also be immediately enacted as a follow-up to any workplace accident or unintended event that has potential to have caused occupational exposure to 1080.

Consent

It is important for employers to communicate to employees that the purpose of a monitoring program is **protective**. It is in both parties' interests that exposure of workers to 1080 is absolutely minimised, and a monitoring program based on routine urine sampling is the easiest way to measure this. Employees should be provided with adequate information and the opportunity to ask questions about why and how monitoring will be carried out.

There is obviously a voluntary element to employees providing urine samples that meet the requirements of a suitable monitoring program. Nevertheless, the onus is on the employer to encourage employee participation in (and understanding the reasons for) routine monitoring. This may be achieved by making participation in monitoring programs a condition for new employees, as part of the organisation's wider health and safety program. Existing employees should be asked to provide written agreement to their participation – an example consent form is shown in Appendix 1.

Confidentiality & availability of monitoring results

The employer is responsible for maintaining confidentiality in reporting results of monitoring back to individual workers. Employers should appoint a person to co-ordinate monitoring (see Section 5) and maintain records of the results, subject to the following conditions;

- Urine samples taken as part of routine monitoring for occupational exposure to 1080 will be submitted to a suitably-accredited laboratory for **analysis of fluoroacetate only**;
- Urine samples submitted to the laboratory for analysis by the employer should be clearly labelled with a unique (preferably anonymous) identifier, which will be used for entering results into a national database and reporting results back to the employer;
- Results are reported by the laboratory back to the employer's co-ordinator, who will then inform individuals of only that individual's results. After this, individuals are free to disclose their own results to others if they choose.

The results of all urine/fluoroacetate analyses (including unique identifier, employer, date and time of sample and result) will be retained in a database by the laboratory. The intent of maintaining this database is to provide an auditing tool for agencies, such as the Animal Health Board (AHB) and DOC. When such agencies call for contracted pest control services involving 1080 they can be assured, through the database, that contractors have a track record of employee monitoring, and evidence that occupational exposure of their employees is being minimised.

5. HOW TO MONITOR

A summary of good urine sampling procedures has been produced in handout format by the AHB (see Section 8, 'Further Information') and should be provided to workers participating in a monitoring program.

Obtaining the samples

Urine samples should be taken in a clean environment free from any possibility of sample contamination, i.e. well away from areas where 1080 products are handled, transported or stored. The testing method used is extremely sensitive (the method limit of detection is 1µg/mL), hence even minute amounts of 1080 may be detected. Sample containers must not, therefore, become contaminated in any way, even externally.

Ideally the sample should be taken after the worker has removed work clothes, showered and dressed in clean clothes. Workers can be given appropriate containers to take home and return the sample to the employer the following day. If this is not practical, the person giving the sample should at least remove protective gear or outer clothing, and wash hands thoroughly beforehand.

As urine sampling can only indicate recent exposure to 1080, samples should ideally be taken both before **and** after any period that involves working directly with or in close proximity to 1080 formulations as follows:

- within 2 hours before beginning work, and
- **ideally within 2 hours**, but certainly within 12 hours, after finishing work, and only once the worker has had a change of clothing and a wash, and where practical, has showered.

Sample containers and labelling

The sample is to be produced into a clean, disposable container and transferred to a 70mL polypropylene specimen container supplied by the employer. A minimum volume of 40mL is required, as samples may need to be analysed in duplicate to confirm the result.

The following items can be obtained from Biolab (see www.biolabdirect.co.nz):

- Pink-topped, non-sterile sample bottles: see LabServ catalogue LBS30002, box of 500 units, approximate cost \$95
- Urine collection cup 100ml sleeves, LBSUPN100, 50 box 1000, approximate cost \$185.

Sample containers must be labelled with permanent ink to uniquely identify the samples they contain, including identifier code, date and time that the sample was taken. A completed sample submission form **must** accompany samples submitted to the laboratory for testing, with the employer retaining a copy of the completed form. A submission form is included in Appendix 3 for photocopying as required. Alternatively download it from http://www.landcareresearch.co.nz/services/laboratories/toxlab/protocol_urine.asp

Transporting the samples

Send samples by door-to-door courier. No special declaration is required.

For samples taken at work sites in remote areas, ensure there will be adequate frozen storage and transport of samples, e.g. arrange for portable refrigerator or dedicated transport of samples from the site.

Time stored before transport to the laboratory	Storage temperature
Less than 1 day	Keep chilled (~5°C)
More than 1 day	Freeze (at least -4°C)

Transport samples to the laboratory within 2 days of sampling, either chilled (3–10°C) or frozen .

This is best accomplished by including freezer packs with the sample set and packing the samples upright in a polystyrene chilly bin.

Laboratory testing

On receipt, the laboratory will record details of the sample in its sample register. The sample will be placed in a freezer at -20°C to await analysis, or, if urgent, analysed immediately.

Testing turn-around times:

- usually within 7 working days (maximum 15 working days),
- a 24-hour service is available for critical samples (see Appendix 4 for price list).

The analytical method used by the Landcare Research toxicology laboratory for detecting fluoroacetate in urine is accredited by IANZ. Results will be reported as a formal laboratory report provided to the employer on completion of the testing.

6. WHEN AND HOW OFTEN TO MONITOR

Beyond 'baseline' requirements (see below) it is difficult to set prescriptive requirements for how often, and how extensive a monitoring program should be, as each employer will have varying numbers of workers performing a range of duties associated with 1080. The total number and continuity of hours a worker might spend working directly with, or in close proximity to, 1080 formulations will also vary greatly.

Minimum monitoring requirements

For each individual worker the recommended minimum requirements for a monitoring program are as follows.

- Monitor at least once per calendar year if the person undertakes any duties involving potential exposure to 1080. This covers permanent workers who may have a 1080-related job only once annually or casual workers who are employed for only short durations.
- Undertake monitoring during the first job in a calendar year that involves potential exposure to 1080.
- **A post-shift sample on the last day of the job involving 1080 is the base minimum.**

Recommended additional monitoring

Monitoring undertaken to date indicates that exposure risk is highest for workers on aerial carrot operations, followed by aerial cereal operations and then ground control work. While the minimum requirement above includes all tasks that may have an exposure risk, more intensive monitoring is recommended for individuals carrying out high risk tasks in aerial carrot baiting operations, such as poison mixing, bag handling and hopper loading.

For workers on aerial operations, recommended monitoring is as follows.

- Monitor twice per calendar year - i.e. across two operations.
- Take pre- and post-shift samples from each worker on every day they work at high risk tasks in the baiting operation.
- The two baiting operations monitored should be relatively early and late in the season respectively.

Planning and record keeping

Each employer should design and implement a monitoring program tailored, as appropriate, to the extent of potential exposure and the frequency of tasks involving 1080. Particularly in initial monitoring programs, the sampling regime will assist the employer to determine whether exposure is occurring in association with particular duties and/or work practices, and address this with changes and follow-up monitoring.

The frequency of monitoring individual workers will also be determined by test results (see Section 7 'Consequences of Detecting 1080').

Employers will seek to minimise their monitoring costs but, at the same time, need to tangibly demonstrate that occupational exposure of their workers to 1080 is being minimised. It is therefore essential that they keep good records of their monitoring programme in a form that can be audited. An established 'track record' of monitoring results also provides the employer with the information needed to plan ongoing monitoring:

- if the records show that worker exposure is minimised, it would be appropriate to maintain the minimum monitoring requirements; whereas,
- if exposure is being detected, monitoring frequency (i.e. over more operations or tasks involving 1080) and /or intensity (more pre- and post- shift samples taken from an individual within the period of an operation or task) should be increased.

Good records will help to give an overview over time – with the objective of achieving monitoring results that give the 'all clear'. A suggested format for employer record-keeping is shown in Appendix 2.

7. CONSEQUENCES OF DETECTING 1080

Under the Biological Exposure Index (BEI) an acceptable exposure level for 1080 in humans is 15µg fluoroacetate per litre of urine (or 15 parts per billion). This level was calculated conservatively with the inclusion of safety factors to account for the possibility of significantly greater human sensitivity to chronic toxic effects of 1080 than that found in test animals.

The OSH '*Guidelines for the Safe Handling and Use of Sodium Fluoroacetate*' (see Section 8 'Further Information') provides more detail on how the BEI was calculated and how it represents 'acceptable' exposure. The currently available test method can detect fluoroacetate concentrations in urine to 1µg/L (1 part per billion).

If a urine sample returns an above-BEI test result (a concentration of ≥15µg fluoroacetate per litre), the employer should:

- review that individual's previous monitoring history, and
- the circumstances of the job and shift on which the positive urine sample was given.

If contamination of the sample can be ruled out, pre- and post-shift monitoring of that individual should be carried out on the next relevant job.

Repeated positive tests may indicate that work practices and PPE are not providing adequate protection from occupational exposure to 1080, or that the employee is not observing practices and using equipment in a manner that ensures exposure is minimised. The employer will need to consider such results on a case-by-case basis to determine the most likely explanation and appropriate action in response, e.g:

- Audit handling practices and PPE to identify potential instances of exposure during the task associated with the above-BEI result;
- Change handling practice and PPE to prevent suspected exposure and re-monitor.
- Stand down the individual from jobs that were associated with the above-BEI result. A suggested follow-up approach is that the worker remain stood down if a second test a week later is still above BEI, and not return to work until a third (or later) test is below it.

Above-BEI results are considered unacceptable in terms of the OSH guidelines, whilst 'no detectable fluoroacetate' (less than 1 part per billion) is an ideal result. However, urine samples that are below the BEI, but still have some detectable concentration of fluoroacetate (i.e. concentrations of ≥ 1 but ≤ 15 μg fluoroacetate per litre) still indicate that exposure has occurred. In these cases further attention is needed to appropriate health and safety precautions, and at least one 'follow up' monitoring of the individual is required.

The emphasis should be on a precautionary approach: establish and maintain minimal exposure in the workplace.

8. FURTHER INFORMATION

How to give a good urine sample Animal Health Board Pamphlet, available from National Possum Control Agencies.

How to prevent 1080 exposure in the workplace, Pamphlet, available from National Possum Control Agencies.

Department of Conservation Standard Operating Procedure: Safe Handling of Pesticides, latest version on DOC website <http://www.doc.govt.nz>

Vertebrate Toxic Agents – Minimum Requirements for the Safe Use and Handling of Vertebrate Toxic Agents. National Possum Control Agencies, 2006. For an online copy go to the best practice guidelines (publication code B2) in the publications section on <http://www.npca.org.nz/>.

Legislation Guide – User Guide to Legislation Relating to Vertebrate Pest Control. National Possums Control Agencies, 2010. For an online copy go to the best practice guidelines (publication code B1) in the publications section on <http://www.npca.org.nz/>

Guidelines for the safe handling and use of sodium fluoroacetate. Occupational Health and Safety, Service Department of Labour, 2002. For an online copy, search under 'Sodium fluoroacetate' at <http://www.osh.dol.govt.nz/order/catalogue/a-z.shtml>

Workplace Exposure Standards Effective from 2002. Occupational Health and Safety, Service Department of Labour. **[Note: this publication contains Biological Exposure Indices for Sodium fluoroacetate (1080)]** For an online copy, go to <http://www.osh.govt.nz/order/catalogue/a-z.shtml#WI>

9. GLOSSARY OF ABBREVIATIONS

AHB	Animal Health Board
BEI	Biological Exposure Index
DOC	Department of Conservation
HSNO	Hazardous Substances and New Organisms Act
IANZ	New Zealand Accreditation Authority: responsible for the accreditation of testing and calibration laboratories, inspection bodies and radiology services.
OSH	Occupational Health and Safety Service
PPE	Personal protective equipment
SOP	Standard operating procedure

Appendix One: Example Consent Form

[Employer Details]

REQUEST FOR INTERPRETER

English	I wish to have an interpreter.	Yes	No
Maori	E hiahia ana ahau ki tetahi Kaiwhakamaori/Kaiwhakapakeha korero.	Ae	Kao
Samoan	Ou te mana'o ia i ai se fa'amatala upu.	Io	Leai
Tongan	Oku ou fiema'u ha fakatonulea.	Io	Ikai
Cook Island	Ka inangaro au i tetai tangata uri reo.	Ae	Kare
Niuean	Fia manako au ke fakaaoga e taha tagata fakahokohoko kupu.	E	Nakai

1. I understand the purpose and requirements of [employer's] monitoring program for occupational exposure to 1080.
2. I have had the opportunity to discuss the monitoring process and ask questions.
3. I agree to provide urine samples in accordance with the [employer's] procedures.
4. I understand that any urine samples I provide for this monitoring program will be tested for fluoroacetate (1080) ONLY.
5. I understand that the results of my participation in the monitoring program are confidential to myself and my employer and that test result data will not be used in any way that will identify me individually.
6. I understand that [employer] or external agencies may use 1080 test results in reports or publications in a way that will not identify me individually.

I,(full name),
 hereby consent to participate in a monitoring program for occupational exposure to 1080.

Signature:

Date:

Witness Signature:

Date

(Note: A copy of this consent form is to be retained by employee)

Appendix Two: Example Employee Track Record Form

This form to be retained as a confidential document by the employer

One sheet per worker – name & allocated sample code for this individual				
Sample date	Sample time pre/post shift	Shift # for the year	Shift tasks - comments	Test result

Appendix Three: Urine Sample Submission Form

LANDCARE RESEARCH TOXICOLOGY LABORATORY

P.O. Box 40
Lincoln 7640
Ph: +61 3 321 9999
Fax: +61 3 31 9998

SAMPLE DETAILS FOR 1080 IN URINE

Analytical results for these samples will be reported to the client shown below only.

Client details:

Name:

Attention:

Address:

Phone: Fax:.....

Date sample sent:.....

Test requirements:

Urgent/ standard* turnaround:.....

Sample identification	Date/Time taken	Remarks

* 15 working days maximum.

Please return to: Lynn Booth, Toxicology Laboratory, Landcare Research, P.O. Box 40, Lincoln, Canterbury 7640, 03 321 9998 (fax)

Appendix Four: Price List for Analysis of 1080 in Urine Samples

Landcare Research (Lincoln) is currently the only laboratory in New Zealand that offers an IANZ-accredited test for fluoroacetate in urine on a fee-for-service basis. It is acknowledged that the cost of testing is an additional imposition on employers, therefore the Landcare Research toxicology laboratory has revised its pricing structure for employers undertaking worker monitoring programmes.

These prices, set in September 2008, were still current at time of printing this document.

Check http://www.landcareresearch.co.nz/services/laboratories/toxlab/protocol_urine.asp for price updates.

The 24-hour service for critical samples requires the following:

- Warning of at least 1 day before sample arrival.
- Samples must be received at the laboratory by 10.30am on the day of testing.
- The service is 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 by 9.30am on the following day.

The prices for testing for 1080 in urine samples are:

Standard rate

1-3 samples	\$309 per sample
4-6 samples	\$231 per sample
>6 samples	\$205 per sample

24 hour service

1-3 samples	\$487 per sample
4-6 samples	\$367 per sample

For a price for larger numbers of samples please contact Lynn Booth.

Phone 03 321 9617 or Fax 03 321 9998

E-mail: boothl@LandcareResearch.co.nz

