

# **Environmental Risk Management Authority Decision**

Application for the Reassessment of a Hazardous  
Substance under Section 63 of the Hazardous Substances  
and New Organisms Act 1996

Name of substances: Methyl bromide and formulated  
substances containing methyl bromide

**Application Number: HRC08002**

**28 October 2010**

**Amended under s67A of the HSNO Act on 1 June 2011**



## Chair's introduction

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Methyl bromide is a broad spectrum fumigant used internationally and in New Zealand for quarantine use. Methyl bromide is required of New Zealand by importing countries on a number of products prior to their shipment and is also used in quarantine applications on imported goods. The application of methyl bromide for large-scale fumigation of export logs under tarpaulins has attracted considerable public interest.

The Authority agreed there were grounds to reassess methyl bromide in July 2008 and the reassessment application was notified in November 2009. Ninety-five submissions were lodged with us and we heard in person from 38 submitters during our week of hearings around the country.

Our decision is to approve the continued use of methyl bromide but impose a new overall management regime which includes strengthening the tolerable exposure limits, requiring air quality monitoring and reporting, and imposing minimum buffer zones. We also are requiring all methyl bromide fumigations to be subject to recapture within a 10-year period. In addition, we recommend more research into alternatives to methyl bromide and recapture technology.

Public opinion is divided on the use of methyl bromide. Almost all of the submitters acknowledged the dilemma faced by the Committee. On the one hand, New Zealand must protect itself from the invasion of pest species and it must meet the requirements of those countries it trades with to continue to be allowed to trade. On the other hand methyl bromide is a highly toxic substance with known health effects if not used and managed properly. It is also an ozone depleting substance and many of its uses are required to be phased out under the Montreal Protocol.

The Committee took full account of the concerns of many (particularly those in areas where large-scale fumigations take place) about the risks and costs involved in the use of methyl bromide. However, the Committee also needed to take into account the critical importance of methyl bromide in relation to quarantine use and use on exports.

Our decision recognises that for the time being there is no practical alternative to the continued use of methyl bromide.

However, the Committee acknowledged that while the current management regime adequately managed the risks, improvements were needed to ensure consistency of approach around the country. This new management regime is designed to focus on the human health risks in particular.

In relation to the ozone depleting properties of methyl bromide the Committee noted that the only method of managing this is to require either a ban of the substance or recapture. As there is no alternative to methyl bromide at present, banning the substance was not considered to be an appropriate option. However, the Committee is of the view that requiring recapture within a 10-year time frame is appropriate and necessary for New Zealand to meet its obligations under the Montreal Protocol and to manage the indirect effects that the use of methyl bromide poses to human health and the environment due to its ozone depleting properties.

The Committee strongly recommends and appeals for research on both recapture technology and alternatives to methyl bromide.

The Committee is requiring annual reporting on a number of matters which will enable the Environmental Risk Management Authority to monitor the use of methyl bromide and the process on researching recapture and alternatives, and respond accordingly.

The Committee wishes to place on record its gratitude to all those who took the time and trouble to present their views to us during the submission and hearing stages of the reassessment. We were greatly impressed with the quality of the presentations. We believe that the hearings have helped clarify a number of misunderstandings as well as contribute to a better informed public debate on methyl bromide use in New Zealand.



Helen Atkins  
Chair  
Methyl Bromide Reassessment Committee of the Environmental Risk Management Authority

29 October 2010

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# 1 Summary of decision

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- 1.1.1 Following consideration of reassessment application HRC08002, the Committee:
- (a) approves the continued importation, manufacture and use of *Gas containing 1000 g/kg methyl bromide* (“methyl bromide”) (HSNO Approval HSR001635) in New Zealand with controls; and
  - (b) declines to approve the further importation or manufacture of:
    - Gas containing 980 g/kg methyl bromide and 20 g/kg chloropicrin (HSNO Approval HSR001637); and
    - Gas containing 300–670 g/kg methyl bromide and 330–700 g/kg chloropicrin (HSNO Approval HSR001638).
- 1.1.2 The controls imposed on methyl bromide are part of a revised management regime which involves three main elements:
- the setting of short-term (1 hour and 24 hour) tolerable exposure limits (TELs) in addition to a chronic TEL;
  - air quality monitoring and reporting requirements;
  - requirements for minimum buffer zones.
- 1.1.3 In addition, 10 years from the date of this decision, all methyl bromide fumigations are to be subject to recapture.
- 1.1.4 The controls that now apply to methyl bromide are set out in **Appendix C**.

## 2 Background to use of methyl bromide in New Zealand

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### 2.1 The substance

- 2.1.1 Methyl bromide is an odourless, colourless gas, used internationally as a broad-spectrum fumigant. It has proved to be a highly effective means of treating timber, agricultural produce, buildings, vessels and containers to eradicate a wide range of pests (including soil-borne fungi, nematodes, weeds, insects, mites and rodents) because of its good penetrating and toxic properties and rapid toxic action. Formulations containing methyl bromide have been registered for use in New Zealand since at least 1970. This application was for the reassessment of three approvals granted under the Act for methyl bromide and related products (HSNO Approval Numbers: HSR001635, HSR001637 and HSR001638). There are currently six products covered by these three approvals.
- 2.1.2 Methyl bromide is imported as a liquid and held under pressure in metal cylinders. It is applied by releasing the liquid through an evaporator<sup>1</sup>/vaporiser which converts it to methyl bromide gas. Methyl bromide is a liquid at 1°C which boils at about 4°C.
- 2.1.3 The use of methyl bromide, particularly for large-scale fumigation of logs, has attracted considerable public interest, largely due to concerns over the potential health effects of the methyl bromide released during ventilation and the recognition that larger quantities of the gas are being used. The main environmental concern around methyl bromide use is its effect on ozone depletion.

### 2.2 Methyl bromide and the Montreal Protocol

- 2.2.1 Methyl bromide was recognised as an ozone-depleting substance under the *Montreal Protocol on Substances that Deplete the Ozone Layer (UNEP Ozone Secretariat 2000)* in 1987 and control measures for the chemical were included in 1992. The Protocol was an international response, based on a scientific consensus, to concerns that continued use of such substances would threaten the integrity of the ozone layer which in the long term would allow greater amounts of ultra violet (UV) radiation to reach the earth's surface and cause harm to human health and the environment.
- 2.2.2 New Zealand, which ratified the Protocol in 1987, was required to phase out the production and consumption of methyl bromide except for quarantine or pre-shipment (QPS) uses and other "critical use" purposes by 1 January 2005.
- 2.2.3 **Quarantine applications** are treatments to prevent the introduction, establishment and/or spread of quarantine pests (including diseases), or to ensure their official control, where:
- (a) official control is that performed by, or authorised by, a national plant, animal or environmental protection or health authority; and

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<sup>1</sup> An evaporator consists of 5 m long coil of copper tubing surrounded by hot water at approximately 70°C.



- (b) quarantine pests are pests of potential importance to the areas endangered thereby and not yet present there, or present but not widely distributed and being officially controlled.

2.2.4 **Pre-shipment applications** are non-quarantine applications applied, within 21 days prior to export, to meet the official requirements of the importing country or the existing official requirements of the exporting country. Official requirements are those which are performed or authorised by a national plant, animal, environmental, health, or stored product authority.

2.2.5 An important aspect of these definitions is that they both relate to *official* actions. Contractual or commercial requirements alone are not sufficient reason to allow exemption from phase-out under the QPS exemption.

2.2.6 Thus, under the Montreal Protocol, methyl bromide can only be used if authorised for QPS purposes by the Ministry of Agriculture and Forestry Biosecurity New Zealand (MAFBNZ) or other relevant government agencies.

### 2.3 Quarantine or pre-shipment use in New Zealand

2.3.1 QPS use of methyl bromide is exempted from the phase out requirements of the Montreal Protocol; however, under the Ozone Layer Protection Regulations 1996 importers are required to obtain an import permit from the Ministry of Economic Development for any amount of methyl bromide to be imported for QPS use.

2.3.2 Methyl bromide is used in New Zealand for the QPS fumigation of logs and other goods in order to:

- ensure that imported goods meet New Zealand's border biosecurity requirements (quarantine use); or
- enable New Zealand exporters to meet the importing requirements of other countries (pre-shipment use).

2.3.3 Pre-shipment fumigation by methyl bromide is a requirement of New Zealand's own biosecurity policy and that of many of our trading partners. New Zealand is among the countries whose use of methyl bromide has increased, largely because of an increase in demand for export timber (logs) by countries requiring methyl bromide use. The increase over time of methyl bromide use for QPS uses can be attributed to increases in imports and exports and therefore increased biosecurity requirements.

2.3.4 The primary QPS uses of methyl bromide are fumigation of:

- logs in ships' holds;
- logs onshore;
- stacks of cut timber;
- shipping containers containing imported goods; and
- commodities at transitional facilities and quarantine treatment centres.

## **2.4 Critical-use exemption (CUE)**

- 2.4.1 In the past, a critical use of methyl bromide in New Zealand was as a soil fumigant for strawberry and strawberry runner growing. This CUE expired on 31 December 2007. However, growers who imported methyl bromide prior to 31 December 2007 were legally able to use it to fumigate strawberry beds until their stocks were exhausted. The Environmental Risk Management Authority (ERMA New Zealand) has been advised that New Zealand strawberry growers have now exhausted the stocks of methyl bromide imported for this purpose.

## **2.5 Ozone layer depletion**

- 2.5.1 The Committee notes that New Zealand has an obligation under the Montreal Protocol to:

*refrain from use of methyl bromide and to use non-ozone-depleting technologies wherever possible. Where methyl bromide is used, Parties are urged to minimise emissions and use of methyl bromide through containment and recovery and recycling methodologies to the extent possible;*

- 2.5.2 Accordingly, the Committee has given particular consideration to the possibility of minimising emissions by requiring applications of methyl bromide to be subject to recapture technology.

## **3 The reassessment of methyl bromide**

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### **3.1 Select Committee**

- 3.1.1 A petition (2002/0182 of Claire Gulman and 1,452 others) was presented to Parliament on 4 August 2005. The petition arose from concern of a possible link between methyl bromide and cases of motor neurone disease reported in people who had worked in the Port Nelson area.
- 3.1.2 Following consideration of this petition, the Local Government and Environment Committee reported to the House on 27 October 2006 recommending that ERMA be asked to reassess methyl bromide and set new conditions as soon as possible. The Government's response to this recommendation was to agree that ERMA should be asked to reassess methyl bromide and set new conditions as soon as possible.

### **3.2 Grounds**

- 3.2.1 On 3 July 2008, the Chief Executive of ERMA submitted an application to establish whether there were sufficient grounds to justify a reassessment of methyl bromide and its formulations.
- 3.2.2 On 18 July 2008, the Authority decided, under section 62(2) of the Act, that there were grounds for the reassessment of methyl bromide and its formulations, namely that there was:
- information available showing a significant change of use of methyl bromide (to meet New Zealand's biosecurity requirements as well as those of trading partners);
  - information available showing a significant increase in the quantity of methyl bromide imported;
  - ongoing public concern relating to the use of methyl bromide for large-scale fumigation of logs; and
  - a need to review the tolerable exposure limit (TEL) for methyl bromide set under the Act.

### **3.3 The application**

- 3.3.1 An application for the reassessment of methyl bromide was prepared by the staff of ERMA (the Agency) on behalf of the Chief Executive under section 63 of the Act.
- 3.3.2 The Agency sought information from a wide range of sources in the preparation of the application, mainly in respect of the New Zealand lifecycle and use of methyl bromide and benefits associated with its use.
- 3.3.3 The Agency also commissioned reports from:
- Dr Martin Edwards of Toxicology Consulting Limited – a review of the toxicological hazard profile and the current HSNO class 6 and 8 classifications for methyl bromide; and

- Dr Bruce Graham of Graham Environmental Consulting Limited – an evaluation of a number of air quality monitoring reports relating to the use of the substance at New Zealand ports.

3.3.4 In addition, the Agency considered publicly available sources of toxicology and environmental fate and effects test data, studies and other references relating to methyl bromide and, to lesser degree, potential alternatives.

3.3.5 The Chief Executive formally submitted the application for reassessment on 4 November 2009.

3.3.6 The Agency's project team comprised the following members of staff:

Name	Title
Andrea Eng	General Manager, Hazardous Substances
Noel McCardle	Senior Advisor, Hazardous Substances
Jim Waters	Senior Advisor, Hazardous Substances
Cora Drijver	Advisor, Hazardous Substances
Richard Mohan	Senior Advisor, Hazardous Substances
Patrick Gemmell	Senior Advisor, Kaupapa Kura Taiao
Janet Gough	Principal Analyst, Strategy and Analysis
Curtis Gregorash	Manager, Legal and Risk

### 3.4 Legislative basis

3.4.1 The application for the reassessment of methyl bromide and its formulations was lodged pursuant to section 63 and, as required under that section, deemed to be an application made under section 29. Section 29 requires the Committee to consider adverse and positive effects of the substance and to make a decision based on whether or not the positive effects of the substance outweigh the adverse effects of the substance.

3.4.2 In making this decision, the Committee has applied the relevant sections of the Act and clauses of the Methodology as detailed in the decision path attached to this decision as **Appendix A**. Unless otherwise stated, references to section numbers in this decision refer to sections of the Act, and clauses, to clauses of the Methodology.

### 3.5 Timeline

3.5.1 The timeline for the application was as follows:

**Table 3.1: Timeline for the application for the reassessment of methyl bromide**

Action	Date
Application formally received	4 November 2009
Application publicly notified	5 November 2009
Public submissions closed	26 February 2010
Update paper circulated	3 May 2010
Hearings held	17–21 May 2010

### 3.6 Time limits and waivers

3.6.1 Under section 59, the Committee waived the statutory time limits three times:

- In response to a request to provide submitters with additional time to prepare submissions, the Committee extended the submission period. The submission period was initially due to close on 18 December 2009 and was extended until 26 February 2010. A press release was issued on 23 November 2009 and an email sent to interested parties on 25 November 2009 advising them of this extension.
- The requirement to fix a hearing date within 30 days after the closing date for submissions was waived, pending finalisation of the Agency's review of the submissions. Hearings were subsequently held between 17 and 21 May 2010.
- Given the high public interest in the reassessment of methyl bromide, the need for the Committee to gather further information and to carefully consider the wide range of views and weigh all the information carefully, the requirement for the Committee to publicly notify its decision no later than 30 working days after the conclusion of the hearing was waived.

### 3.7 Māori interests and concerns

3.7.1 Sections 6(d) and 8 of the Act require that decision making under the Act takes into account the relationship of Māori and their culture and traditions with their ancestral lands, water and other taonga, as well as the principles of the Treaty of Waitangi (Tiriti ō Waitangi).

3.7.2 Accordingly, the Agency held consultative hui with iwi/Māori groups in regions containing ports where there is significant use of methyl bromide (namely Auckland, Tauranga and Blenheim) to canvass iwi/Māori opinion and obtain information about issues or concerns posed by the continued use of methyl bromide.

3.7.3 In addition, opinion was further canvassed at ERMA New Zealand's Māori National Network hui held in Auckland in September 2009.

3.7.4 Ngā Kaihautū Tikanga Taiao, the statutory committee established under the Act to advise the Authority on Māori issues, prepared its own report on the reassessment application.

### **3.8 Ministerial call in**

3.8.1 The Minister for the Environment was advised of the application on 5 November 2009 (under section 53(4)(a)) and given the opportunity to “call-in” the application under section 68. This action was not initiated.

### **3.9 Notification of the application**

3.9.1 In accordance with section 53, the application was publicly notified on the ERMA New Zealand website on 5 November 2009 and advertised in the New Zealand Herald, the Dominion Post, the Christchurch Press and the Otago Daily Times on 7 November 2009.

3.9.2 The application summary was also sent to government agencies which were identified as having a specific interest in the application and interested parties who had indicated that they wished to be notified of this application.

### **3.10 Public submissions**

3.10.1 A total of 95 public submissions were received on the methyl bromide application. A summary of the submissions received is set out in Appendix 1 to the update paper.

### **3.11 Appointment of the committee**

3.11.1 The following members of the Authority were appointed to consider the application (in accordance with a delegation under section 19(2)(b)): Ms Helen Atkins (Chair), Dr Deborah Read, Dr Max Suckling and Mr Richard Woods.

### **3.12 Update paper**

3.12.1 The Agency prepared an update paper to provide the Committee and submitters with a review of the submissions received in response to the public notification of the reassessment application.

3.12.2 In preparing this paper, the Agency reviewed all the submissions and prepared responses to the significant issues. A summary of the submissions was attached as Appendix 1 to the update paper.

3.12.3 The update paper was circulated on 3 May 2010.

### **3.13 Information available for the consideration**

3.13.1 The Committee had available for its consideration the application, the update paper, the Ngā Kaihautū Tikanga Taiao report, the written submissions and additional information provided by submitters prior to the hearings. During the hearings the Committee considered the evidence presented, and the additional information provided by the submitters, Ngā Kaihautū Tikanga Taiao and the Agency.

3.13.2 During the hearings the Committee requested additional information from port authorities about methyl bromide fumigations at their ports and further information on the costs of recapture from submitters.

- 3.13.3 Subsequent to the hearings, the Committee requested further information, in accordance with section 58(1), from various ports, industry and fumigation companies and MAFBNZ on the impacts of requiring the use of recapture technology. The Committee also requested further information from MAFBNZ on the operation of transitional facilities and the use of methyl bromide to control potato wart, a disease caused by a soil fungus which is a notifiable organism under the Biosecurity Act.
- 3.13.4 The Committee is satisfied that it had sufficient information, both relevant and appropriate to the risks, costs and benefits of the substances to enable it to consider the application (clause 8).

### **3.14 Public consultation and hearings**

- 3.14.1 Thirty-eight of the 95 submitters indicated that they wished to be heard in support of their submission at a public hearing.
- 3.14.2 In accordance with section 60 and clause 2(b), hearings were held on the following dates at the following locations:

<b>Date</b>	<b>Location</b>
17 May 2010	The Wellesley Boutique Hotel, Maginnity Street, Wellington
18 May 2010	The Rutherford Hotel, Trafalgar Square, Nelson
19 May 2010	The Mercure Hotel, Waikawa Road, Picton
20 May 2010	The Oceanside Resort & Twin Towers, Mt Maunganui
21 May 2010	The Holiday Inn, Airport Oaks, Auckland

- 3.14.3 The hearings were, therefore, held in some of the locations in New Zealand where methyl bromide is used, namely, Wellington, Nelson, Picton, Tauranga and Auckland.
- 3.14.4 The Committee formally visited three ports (Wellington, Napier and Nelson) and familiarised themselves with the others they did not have time to formally visit. The Committee records their sincere thanks to the ports they visited. The site visits were of great assistance in understanding the issues.
- 3.14.5 The Committee also received written submissions from a number of the port companies and oral presentations from the Port of Napier and CentrePort (Wellington). In addition, representatives from the Port of Tauranga, Ports of Auckland, and Port of Nelson were present at hearings and provided input into the submission process. The Committee also requested and received further specific information from the ports on operational matters as noted above.
- 3.14.6 The Committee thanks all the submitters who presented to them in the hearings as well as the large number of submitters who did not attend the hearings but submitted in writing.
- 3.14.7 In particular, the Committee thanks representatives from MAFBNZ (Ken Glassey),

Genera (Alan Perry), Nordiko Quarantine Systems Pty Ltd (Ken Fitzpatrick and Joe Falco) and Value Recovery (Peter Joyce) who attended more than one hearing and were able to provide answers to questions that arose during the hearings.

- 3.14.8 MAFBNZ has provided valuable information on New Zealand's use and trade of, and biosecurity dependence on, methyl bromide not just at our ports but also at transitional facilities located throughout the country.
- 3.14.9 Nordiko and Value Recovery were able to provide significant information on the recovery and recycling possibilities for methyl bromide and the Committee valued their inputs throughout the process.
- 3.14.10 The Committee heard from Genera Limited (Jon Trevenna) in Tauranga and Alan Perry was able to answer questions throughout the hearings and this was of great assistance. The Committee also heard from two other fumigant companies, Rentokil Pest Control (Rowan Washer) and Ecolab (Eric van Essen). These companies were able to answer some of their questions about the use of fumigants in the transitional facilities. Mr van Essen also presented as the President of the Pest Management Association of New Zealand.
- 3.14.11 Lance Dear of BioVapor (NZ) Limited provided a presentation on an alternative to methyl bromide (heat treatment) that is successfully used at Ports of Auckland for a number of imports, particularly used motor vehicles.
- 3.14.12 The forestry and wood processing industries presented in a number of locations and the Committee heard from:
- New Zealand Forest Owners Association;
  - New Zealand Institute of Forestry;
  - Wood Processors Association of New Zealand;
  - Rayonier New Zealand Limited; and
  - Carter Holt Harvey Limited.
- 3.14.13 Obviously the use of methyl bromide is of fundamental importance to these industries due to the requirements of New Zealand's trading partners (e.g. Australia, China (for ship decks<sup>2</sup>) and India). The Committee heard that wood product prices are highly volatile, particularly for unprocessed logs. This volatility is relevant because the low margins that apply in this industry mean that small changes in costs can have a disproportionate impact on the viability of the trade.
- 3.14.14 Likewise, the Committee heard of minor (in volume terms) but important uses of methyl bromide in the horticulture fresh produce, and farming industries. The Committee thanks Federated Farmers of New Zealand Inc, Horticulture New Zealand, New Zealand Fresh Produce Importers Association Inc, and John and Helen Wright of the New Zealand Comb Honey Producers Association Inc, for their submissions in assisting them to understand the issues faced by these industries.

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<sup>2</sup> Phosphine hold fumigation is permitted for QPS use for China, so methyl bromide is required for logs to be stowed as deck cargo



- 3.14.15 Joseph Stafford of Primal Communication, provided a helpful submission on the Māori perspective of methyl bromide use, including economic considerations as Māori realise the potential of Treaty of Waitangi settlements and are becoming significant owners of forestry resources.
- 3.14.16 The Committee heard from a number of organisations (The Green Party of Aotearoa New Zealand Inc, the Sustainability Council of New Zealand, the Soil and Health Association of New Zealand Inc, the New Zealand Council of Trade Unions Pte, Friends of the Earth and the Royal Forest and Bird Protection Society – Nelson Tasman Branch) concerned about the Agency recommendations that essentially recommend a continued use of methyl bromide with additional controls put in place. The main concern raised by this group of submitters was that the Agency was effectively mandating an increase in methyl bromide use as log demand increases from developing markets (India and China). The Committee acknowledges the reasonable manner in which these submitters presented their submissions in that they were very aware that an immediate ban would be very difficult to achieve due to trading issues. The Committee is grateful to these submitters for the various suggestions and options they presented as to their view of the way forward.
- 3.14.17 The Committee heard from individuals (Sue Lindsay in Nelson and Darryl Marriner in Picton) and community groups (Peter and Takutai Beech for the Guardians of the Sounds, and Gwen Struick for the Friends of Nelson Haven & Tasman Bay Inc.,) who were very concerned about the health and environmental effects of methyl bromide use on them as individuals and on their communities. The Committee acknowledges that there are very strong views held in the community about methyl bromide use and that it was helpful to hear them.
- 3.14.18 Two local authorities (Environment Bay of Plenty and Nelson City Council) and one district health board (Nelson-Marlborough District Health Board) presented on the interface between their functions and those of ERMA. Nelson City Council was advocating that ERMA take the same approach as it has in relation to buffer zones, use of recapture technology and monitoring approaches at Port Nelson.
- 3.14.19 The Ministry of Health presented from a biosecurity perspective on the importance of methyl bromide use to control insects that have public health impacts (such as mosquitoes that are commonly found in shipments of used tyres).
- 3.14.20 The Committee wishes to thank Tom Batchelor and Melanie Miller for their thoughtful submission which Melanie presented orally via a telephone conference link. The information provided in the written submission and Melanie's answers to the Committee's questions have been of assistance to them.
- 3.14.21 Gordon Hosking from Stakeholders in Methyl Bromide Reduction (STIMBR) presented on the work of that group in finding ways to reduce methyl bromide use and find alternatives that are acceptable to our trading partners.
- 3.14.22 The Committee also thanks Professor Ian Shaw from the University of Canterbury who accepted its invitation to attend the hearing in Wellington and provide the Committee with a presentation into his work on a possible link between methyl bromide use and motor neurone disease.

3.14.23 Finally, the Committee is grateful to both Ngā Kaihautū Tikanga Taiao and the Agency team for their reports on this important matter and wishes to reiterate its thanks to all submitters including those who made written submissions but did not attend the hearings.

## 4 Sequence of the consideration

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4.1.1 In accordance with the Methodology, and as outlined in the decision path used by the Committee (set out in Appendix A), the approach to the consideration adopted by the Committee was to:

- review the available information (clause 8);
- establish the hazard classifications for each substance and derive the default controls that are prescribed under section 77 for each classification;
- identify potentially significant risks, costs, and benefits (covered by clauses 9 and 11);
- assess the potentially significant risks and costs (risks were assessed in accordance with clause 12, and costs in accordance with clause 13) using recognised techniques (clause 24). The adequacy of the default controls, prescribed under section 77 was considered alongside the assessment of risks and costs to determine whether those controls should be varied and identify where additional controls need to be applied, under section 77A, to mitigate any unacceptable risks;
- consider all the risks and costs and determine whether the individual risks and costs (when combined) are negligible or non-negligible;
- review any non-negligible residual risks and determine whether the decision should follow clause 26 or clause 27;
- establish the approach to risk with respect to the individual non-negligible risks in accordance with clause 33;
- consider (a) whether any of the non-negligible risks could be reduced by varying the controls in accordance with sections 77 or 77A, and (b) the cost-effectiveness of the application of controls in accordance with clause 35 and sections 77 and 77A;
- assess the benefits associated with this application in accordance with clauses 9, 11, 13 and 14 and section 6(e);
- taking into account the risk characteristics established under clause 33, weigh up the risks, costs and benefits in accordance with clause 26 or clause 27 and clause 34 and section 29 taking into account aspects of uncertainty (clauses 29, 30 and 32) and determine whether the application should be approved or declined; and
- confirm and set the controls.

## 5 Ethical considerations

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- 5.1.1 In preparing this decision, the Committee has taken into account the ERMA New Zealand ethics framework. This framework was developed as a tool to assist in the ERMA New Zealand decision-making process in terms of:
- asking the ‘right’ questions in order to identify ethical issues that need to be considered; and
  - using the answers to those questions to explore how ethical considerations should be addressed.
- 5.1.2 The foundation of the framework is a set of ethical principles, supported by procedural guidelines and standards. The two general principles embodied in the Act and the Methodology are:
- respect for the environment; and
  - respect for people (including past, present and future generations).
- 5.1.3 Under these general principles lies a set of specific principles which includes concern for animal welfare, concern for co-operation, concern for cultural identity, concern for sustainability and concern for peoples’ wellbeing.
- 5.1.4 The primary mechanisms for supporting the principles outlined in the framework and for evaluating whether or not they are upheld are the following procedural standards:
- honesty and integrity;
  - transparency and openness;
  - a sound methodology;
  - community and expert consultation; and
  - fair decision-making process.
- 5.1.5 In its consideration, the Committee has been mindful of the criteria in the procedural standards listed above, and has reviewed all of the information made available to it in the context of the principles and procedural standards. The Committee has been respectful of the views expressed by the applicant and submitters.
- 5.1.6 The Committee has used the principles in the framework to help analyse ethical dilemmas such as where submitters expressed opposing views about effects of methyl bromide. In this regard, the Committee notes that many of the issues raised in submissions focused on the effects of methyl bromide on human health.

## 6 Treaty of Waitangi

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### 6.1 Principles of the Treaty of Waitangi

- 6.1.1 All persons exercising powers and functions under the Act are required (under section 8) to take into account the principles of the Treaty of Waitangi (Tiriti o Waitangi). The Authority has developed the Protocol “Incorporating Māori Perspectives in Part V Decision Making” to provide some guidance in the consideration.
- 6.1.2 There is no exhaustive list of Treaty principles, rather the Courts and the Waitangi Tribunal have made it clear that they continue to evolve as the Treaty is applied to particular issues and new situations. However, when reviewing the issues raised by this reassessment application, the Committee has focused its attention on the generally accepted principles of partnership, participation and protection.

### 6.2 Partnership and participation

- 6.2.1 The principles of partnership and participation refer to the shared obligation on both the Crown and iwi/Māori to act reasonably, honourably and in good faith towards each other to ensure the making of informed decisions on matters affecting the interests of Māori.
- 6.2.2 In reference to this reassessment application, the Agency undertook consultative hui with iwi/Māori most affected by the use of methyl bromide (i.e. those in proximity to major ports utilising the substance) to ensure issues and interests were reflected in the application.
- 6.2.3 Implementing these principles may extend to the inclusion of a control requiring the involvement of iwi/Māori in local decision making regarding any ongoing operational use and management of the substance.
- 6.2.4 This issue was highlighted by Māori attending the consultation hui, where they stressed the desire to be part of a process that enables a traditional control such as rāhui in managing any adverse effect arising from specific activities. The Committee notes the consideration of this issue in Section 5.4 of the reassessment application.

### 6.3 Active protection

- 6.3.1 The principle of active protection is of particular relevance in this application and refers to the Crown’s obligation to take positive steps to ensure that Māori interests are protected, and to consider them in line with the interests guaranteed to Māori in Article II of the Treaty. Specifically, the Court of Appeal in the 1987 *Lands* case<sup>3</sup> noted that “... the duty of the Crown is not merely passive but extends to active protection of Māori people in the use of their lands and waters to the fullest extent practicable”.
- 6.3.2 Taking into account the principle of active protection requires this application to

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<sup>3</sup> *New Zealand Maori Council v Attorney-General* [1987] 1 NZLR 641

provide sufficient evidence to show that the use of methyl bromide does not pose significant risk to native or taonga species, ecosystems and traditional Māori values, practices, health and well-being. A number of these issues were addressed by the Agency in Section 5.4 of the reassessment application, but overall there are differing Māori views on the risks posed by methyl bromide and the opportunities afforded by its continued use.

- 6.3.3 Given the recommendations made and controls outlined in this decision the Committee considers that the implementation of this principle is provided for.

#### **6.4 Ngā Kaihautū Tikanga Taiao**

- 6.4.1 Ngā Kaihautū Tikanga Taiao, the statutory committee established under the Act to advise the Authority on Māori issues, prepared its own report on the reassessment application during the public submissions period.
- 6.4.2 The Committee had an oral presentation (via teleconference) from Ngā Kaihautū Tikanga Taiao where there was an opportunity for them to expand on their submission and answer questions.
- 6.4.3 Ngā Kaihautū Tikanga Taiao's submission is reflected in the Committee's assessments of the adverse and beneficial effects to Māori of methyl bromide use.

## 7 The substances

7.1.1 The reassessment application related to three existing approvals granted under the Act for methyl bromide and related products. These approvals and their related registrations under the Agricultural Compounds and Veterinary Medicines Act 1996 (ACVM Act) are shown in Table 7.1 as follows:

**Table 7.1: Methyl bromide-based products with HSNO approvals**

HSNO approval #	Substance description		Trade names	ACVM registration no.	Registration date
HSR001635	Commodity Fumigant	Gas containing 1000 g/kg methyl bromide	AG Fume methyl bromide	P003401	26 November 1985
			Brima-Fume Methyl Bromide	P003888	3 August 1990
HSR001637	Gas containing 980 g/kg methyl bromide and 20 g/kg chloropicrin		Brima-Fume Methyl Bromide Fumigant	P003886	21 December 1988
HSR001638	Gas containing 300 – 670 g/kg methyl bromide and 330 – 700 g/kg chloropicrin	670 g/kg methyl bromide 330 g/kg chloropicrin	Bromafume Soil Fumigant	No longer registered	21 December 1988
		300 g/kg methyl bromide 700 g/kg chloropicrin	Vertafume	P007248	26 April 2005
		500 g/kg methyl bromide 500 g/kg chloropicrin	Fungafume	P007249	26 April 2005

7.1.2 As the importation of methyl bromide for non-QPS uses is now unlawful under the Ozone Layer Protection Regulations, the Agency did not assess the risks associated with those methyl bromide products currently approved (approvals HSR001637 and HSR001638) for use as soil fumigants.

7.1.3 MAFBNZ has indicated that methyl bromide is used as a soil fumigant for controlling potato wart and has advised that they use Brima-Fume Methyl Bromide (covered by HSNO approval HSR001635).

- 7.1.4 The Committee considers that the other soil fumigant approvals, that is the ones containing chloropicrin (covered by HSNO approvals HSR001637 and HSR001638), should not be continued. Details of the prohibition of further use of these substances are set out in Section 16.14 of this decision.



## 8 Hazard classifications

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- 8.1.1 In the reassessment application, the Agency provided a review of the HSNO classifications for methyl bromide and substances containing it. As a result of the review, the Agency proposed four changes as follows:
- change from 6.3A (skin irritancy) to 8.2C (skin corrosivity) based on the reported severity of the damage (partial thickness second degree burns) after human exposures to methyl bromide in liquid form.
  - change from 6.4A (eye irritancy) to 8.3A (eye corrosivity) based indirectly on the severity of skin damage after human exposures.
  - change the soil ecotoxicity classification from 9.2A to 9.2D on the basis that the only valid data available is that on nematodes and this indicates a 9.2D classification.
  - change the 9.4A classification to 9.4 (unspecified) as while methyl bromide is designed for biocidal action against invertebrates, there is no data available to enable definitive classification.
- 8.1.2 The Committee agrees with the proposed changes from 6.3A (skin irritancy) to 8.2C (skin corrosivity) and from 6.4A (eye irritancy) to 8.3A (eye corrosivity).
- 8.1.3 However, the Committee has decided to retain the current 9.2A and 9.4A classifications as methyl bromide, used as a fumigant, is known to eradicate all soil organisms and invertebrates.
- 8.1.4 The HSNO classification of methyl bromide is as follows:

**Table 8.1 HSNO classifications of methyl bromide**

<b>Hazardous property</b>	<b>HSNO classification</b>
Flammable gas	2.1.1B
Acute toxicity (oral)	6.1C
Acute toxicity (inhalation)	6.1B
Skin irritancy/corrosivity	8.2C
Eye irritancy/corrosivity	8.3A
Mutagenicity	6.6B
Reproductive/ developmental toxicity	6.8B
Target organ systemic toxicity	6.9A
Aquatic ecotoxicity	9.1A
Soil ecotoxicity	9.2A
Terrestrial vertebrate ecotoxicity	9.3B
Terrestrial invertebrate ecotoxicity	9.4A

## 9 Previous management regime

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- 9.1.1 In Section 4 of the reassessment application, the Agency listed the previous controls applying to methyl bromide and formulations containing methyl bromide. These controls were prescribed as part of the approval of these substances under the Act and the Agricultural Compounds and Veterinary Medicines Act 1997, and through requirements under the Resource Management Act 1991 (the RMA), the Health and Safety in Employment Act 1992 and the Biosecurity Act 1993.
- 9.1.2 The previous controls under HSNO comprise the regulations (known as default controls) assigned to the substances based on their hazardous properties, with variations and additions to these controls which were applied to these substances at the time of transfer from control under the Fumigation Regulations 1967 (pursuant to the Health Act 1956) to the HSNO Act. The full set of HSNO controls currently assigned to these substances is set out in **Appendix G** of the reassessment application.
- 9.1.3 The current controls were used as a reference point in the Agency's application and the risk assessment on the use of methyl bromide was carried out with the assumption that the previous controls are in place.

## **10 Current lifecycle of methyl bromide in New Zealand**

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### **10.1 Manufacture**

10.1.1 Methyl bromide is not manufactured in New Zealand.

### **10.2 Importation**

10.2.1 Methyl bromide is imported by sea as a liquid in 50 kg and 100 kg pressurised metal cylinders packed in shipping containers and delivered direct to the importer where they are removed from the shipping containers and stored in purpose-built storage facilities.

10.2.2 Two companies, Agricultural Fumigation Ltd (in Auckland) and Leicester's New Zealand Ltd (in Napier), import methyl bromide into New Zealand. Entitlement to import methyl bromide for general use was allocated to these two wholesalers on the basis of their market share in 1993. Import permits are issued annually and are subject to reductions as set out in the Ozone Layer Protection Regulations 1996.

### **10.3 Transport**

10.3.1 Transport within New Zealand is by sea or road.

10.3.2 Methyl bromide is only on-sold by the importer to MAFBNZ-accredited operators (the customer must present their approved handler certificate and controlled substances licence (CSL), if applicable<sup>4</sup>). Cylinders are either picked up by customers or the cylinders are transported by commercial transport operators (sea and road).

10.3.3 Operators must carry gas cylinders, packages of fumigant and associated equipment in a secure way, outside the passenger compartment of transport vehicles. These cargo areas are kept well ventilated at all times and respiratory protective equipment (RPE) is available in the driver's cab in case of emergency. RPE is kept in a suitable container with the canister/filter in a sealed plastic bag to ensure it is not exposed to chemicals until needed. Emergency response information is also required to be carried.

### **10.4 Storage**

10.4.1 Long-term storage by the importer or by users is in purpose-built facilities that comply with New Zealand regulations.

### **10.5 Disposal**

10.5.1 When cylinders have been emptied they are returned to the importer and from there shipped back to the manufacturer in the United States. A deposit scheme for the cylinders is operated by importers to ensure a high return rate.<sup>5</sup>

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<sup>4</sup> A person does not need a CSL if the aggregate quantity of the fumigant being handled is less than 3 kg.

<sup>5</sup> One of the two importers quotes a 100% return rate.

## **10.6 Use of methyl bromide**

10.6.1 Methyl bromide is used in New Zealand for QPS purposes on import and export goods. Information on the range of treatment methods used in New Zealand has been obtained from a number of operators.

### **Logs in a ship's hold**

10.6.2 The required quantity of methyl bromide for logs in a ship's hold is injected as a gas, by means of a vaporiser, and the holds sealed up for 12 to 24 hours depending on the importing country requirements. The holds are then ventilated. The procedure used for venting can vary significantly between ports and under different circumstances.

### **Logs under sheets**

10.6.3 Logs under sheets are fumigated onshore, preferably on a sealed surface. The piles of logs are covered with low-permeability tarpaulins, and a ground seal is achieved by placing water or sand "snakes" around the edges. The fumigant is injected inside the enclosure and left for 12 to 24 hours. The "snakes" are then removed, followed by removal of the tarpaulins.

### **Stacks of timber under sheets**

10.6.4 Timber stacks may be treated outdoors or inside a building. The stacks are covered with tarpaulins and treated in much the same way as logs. The buildings may be either naturally ventilated (via open doors, windows and vents) or force ventilated using fans. At the Port of Nelson timber stacks are fumigated within a building, and after fumigation are initially connected to an activated carbon absorption unit.

### **Containers**

10.6.5 Treatment of containers may take two forms. Groups of containers are covered with tarpaulins, with the container doors left slightly ajar to assist fumigant penetration. Ventilation is done in two stages, with the tarpaulins being removed first, and the container doors fully opened after about 30 to 60 minutes.

10.6.6 Alternatively, and more commonly, containers may be fumigated without using tarpaulins. The fumigant is injected through the door seal. At the end of the treatment period, the doors are opened wide to allow the gas to disperse.

### **Transitional facilities**

10.6.7 Fumigation with methyl bromide can be carried out at locations other than ports. These locations must be MAFBNZ approved transitional facilities where cargo is consolidated. There are approximately 6,000 transitional facilities some of which may fumigate only one or two containers per year and many of which may not fumigate at all in a given year.

10.6.8 At most transitional facilities treatment takes place either under a tarpaulin or inside a container.

### **Use of methyl bromide for the management and eradication of potato wart**

- 10.6.9 Potato wart is a disease that disfigures potatoes and is caused by a persistent soil-borne fungus *Synchytrium endobioticum*. MAFBNZ has advised that it regards methyl bromide as an essential tool in the management and eradication of potato wart and that the use of methyl bromide for controlling potato wart is a legitimate quarantine use (i.e. exempted from the Montreal Protocol).
- 10.6.10 Eradication operations involving soil fumigation treatment with methyl bromide are carried out by commercial fumigation contractors, employed byASUREQuality Ltd. This involves soil fumigation under heavy polyethylene sheeting using a border trench to maintain a perimeter seal for at least 24 hours.

## 11 Alternatives

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- 11.1.1 In the reassessment application, the Agency reviewed the potential alternatives to methyl bromide fumigation and concluded that there is no single alternative fumigant or method of treatment to replace methyl bromide for all intended uses or overseas markets.
- 11.1.2 This situation was confirmed by submitters who noted that:
- fumigation of logs with phosphine is accepted for export to the Peoples' Republic of China (logs fumigated above deck are excluded from this (ie they are fumigated using methyl bromide ), Japan, Malaysia and the Republic of Korea. However, negotiations with India over possible use of phosphine have been in progress for four years to date with no swift resolution expected;
  - for quarantine purposes, treatment is required to be fast (ie within a 24 hour period). It was noted that phosphine treatment takes 7 to 10 days and therefore for quarantine purposes some insects cannot be controlled by this gas;
  - heat treatment has been used in place of methyl bromide for imported used vehicles and machinery, International Organization for Standardization (ISO) shipping containers and for International Standards For Phytosanitary Measures No. 15 (ISPM 15) wood treatments;
  - only a small proportion of New Zealand's horticultural exports is fumigated with methyl bromide and its use is restricted to circumstances where an importing country specifically requires methyl bromide fumigation or where no other treatment is available;
  - used tyres are fumigated with methyl bromide to prevent exotic mosquitoes entering New Zealand;
  - methyl bromide fumigation is necessary to protect honeycomb from wax moth. Such fumigation is required for export purposes and alternative procedures are not available; and
  - methyl bromide is also used in a limited way for some horticulture products where there is no alternative available.
- 11.1.3 The Committee acknowledges that it is not possible to replace methyl bromide with a single fumigant or a single type of treatment. However, the Committee recommends the replacement of methyl bromide where possible, particularly in areas where alternative methods of treatment, such as phosphine and heat treatment, are available and acceptable.
- 11.1.4 The Committee also strongly encourages industry and other parties to actively encourage and stimulate research into alternatives. Likewise the Committee strongly encourages MAF and industry to negotiate with our trading partners with a view to reducing the amount of methyl bromide being used as a result of trading partners' requirements.

## 12 Assessment of adverse effects

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### 12.1 Summary

- 12.1.1 The Committee's view, set out in more detail below, is that the adverse health effects of the continued use of methyl bromide and formulations containing methyl bromide are primarily associated with potential exposure of workers and the general public. The Committee notes the high degree of public concern in some places regarding potential adverse human health effects from the use of methyl bromide.
- 12.1.2 The Committee is satisfied that, while potential adverse health effects associated with methyl bromide fumigation can be adequately managed by the controls currently in place, improvements to the overall management regime should be made to better ensure the health and safety of workers and the general public.

### 12.2 Introduction

- 12.2.1 Adverse effects, or risks and costs, are assessed in terms of the magnitude of the consequence of the effect if it should arise and the likelihood of the effect occurring.
- 12.2.2 Much of the evidence available to the Committee was largely scientific in nature and was considered in terms of clause 25(1) of the Methodology, taking into account the degree of uncertainty attaching to that evidence. This evidence comprised the information provided by the Agency in the application and update paper, evidence provided in submissions at or following the public hearings and the advice of experts (as outlined in Section 3.13).
- 12.2.3 In each case, the Committee's assessment includes a discussion of:
- the nature of the adverse effect (clause 12(a));
  - an assessment and evaluation of likelihood and consequences (clause 12(b)), noting that the methods for these assessments follow recognised techniques (clause 24) and are made taking account of the application of controls;
  - an assessment of the level of risk as a combination of the likelihood of occurrence and the magnitude of the adverse effect (clause 12(c));
  - the options and proposals for managing the risks identified (clause 12(d)); and
  - the uncertainty bounds (clause 12(e)) and how uncertainty affects the assessment of the risk (clauses 25 – scientific and technical uncertainty; 29 – materiality of uncertainty; and 30 – the need for caution where uncertainty is not resolved).
- 12.2.4 Clause 33 of the Methodology requires the Committee to have regard to the extent to which a specified set of risk characteristics exist when considering applications. The intention of this provision is to provide a route for determining how cautious or risk averse the Committee should be in weighing up risks and costs (adverse effects) against benefits (positive effects).
- 12.2.5 Where risks are considered to be potentially significant, the Committee has discussed these characteristics and established a position on its approach to risk.

## **12.3 The Committee's assessment of the adverse effects of methyl bromide**

12.3.1 In the following sections (12.4 to 12.8) the Committee sets out its assessment of the adverse effects of methyl bromide on:

- human health;
- the environment;
- the relationship of Māori to the environment;
- society and communities; and
- the market economy.

12.3.2 In conducting its assessment, the Committee followed the following steps, it:

- (a) identified the potentially significant effects that could occur in the areas listed in paragraph 12.3.1;
- (b) assessed the level of risk taking into account the existing controls that apply to methyl bromide;
- (c) revised the controls with a view to mitigating the level of risk; and
- (d) assessed the level of risk taking into account the revised controls.

## **12.4 Adverse effects on human health**

12.4.1 The Committee's qualitative assessment reviewed the likelihood that people will be exposed to methyl bromide during the different stages of the substance's lifecycle, and the extent to which this exposure will result in adverse effects on human health.

12.4.2 The adverse effects on human health have been assessed separately for the following sub-populations:

- fumigation operators (people carrying out the fumigation with methyl bromide);
- occupational bystanders, who are people who work in the vicinity, but are not working on the fumigation itself; and
- the general public<sup>6</sup> (also called non-occupational bystanders).

12.4.3 The Committee notes that an individual may at different times fall within more than one of these descriptions.

### **Nature of adverse health effects**

12.4.4 The Committee notes that the adverse health effects associated with methyl bromide exposure are primarily the effects of inhalation of relatively low concentrations which can cause destruction of the nasal epithelium.

12.4.5 The Committee also notes that exposure to higher concentrations may be associated with reproductive toxicity (based on studies in rats showing reduced fertility and reduced offspring weights), developmental effects (in animal tests at exposures

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<sup>6</sup> In the application and update paper the general public were referred to as "non-occupational bystanders"



causing maternal toxicity) and mutagenicity (based on animal studies). Damage to the central nervous system is the most common finding in humans following high accidental exposures. Skin and eye damage from direct contact with the liquid has also been reported in humans.

- 12.4.6 A number of submitters raised concerns that exposure to methyl bromide is associated with an increased risk of motor neurone disease, due to some cases reported in Port Nelson workers. The Committee considers that the conclusions of the review of the cases that occurred at Nelson by the Medical Officer of Health are still valid.<sup>7</sup> The Medical Officer of Health concluded that:

*... the most likely explanation for the group of cases who had a work history involving work sites in the Port Nelson area was "chance".*

- 12.4.7 The Committee notes that recent research by Professor Shaw of the University of Canterbury on the effects of methyl bromide on nerve cells<sup>8</sup> is cited by some submitters. As mentioned above Professor Shaw attended the Wellington hearing at the Committee's request. The Committee records that Professor Shaw stated at the hearing that his research is at a preliminary stage and it currently does not confirm a causal link between methyl bromide exposure and motor neurone disease.
- 12.4.8 The Committee acknowledges the high degree of public concern in relation to the adverse health effects of methyl bromide that exists in some local communities. The Committee has assessed this high degree of public concern in Section 12.6 – effects on society and communities.

#### **Risks to human health associated with import and distribution**

- 12.4.9 The Committee notes the very strict requirements relating to cylinders containing methyl bromide and the manner in which they may be transported around the country. The Committee is satisfied that the level of risk associated with transportation of methyl bromide is negligible.

#### **Risks to human health associated with disposal of methyl bromide**

- 12.4.10 In relation to disposal methyl bromide is unlikely to require disposal as the gas is completely used up when applied, therefore the Committee considers that the level of risk associated with disposal is negligible based on its assessment of the risk.

#### **Risks arising from occupational exposure to methyl bromide**

##### *Fumigation staff*

- 12.4.11 The Committee notes the extensive controls that currently apply to the use of methyl bromide. These include the use of personal protective equipment, signage at fumigation sites and the training of staff.
- 12.4.12 In particular, fumigation staff must be licensed and hold approved handler test certificates. Accordingly, fumigation staff are trained to ensure safe practice when

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<sup>7</sup> Kiddle, E. (2005). *Cluster Investigation into Motor Neurone Disease Nelson*. Nelson, Nelson Marlborough District Health Board.

<sup>8</sup> Shaw I (March 2010). "Motor neurone disease – a methyl bromide exposure cluster points to a causal mechanism" *Human and Experimental Toxicology*, Vol 29 (3), p241 – 242.

handling methyl bromide and they will have knowledge of the safe use of personal protective equipment, including respiratory protective equipment (RPE) and the use of methyl bromide gas detection equipment.

- 12.4.13 The Committee notes that guidance on these requirements is set out in the Pest Management Association of New Zealand (PMANZ) Code of Practice which is a HSNO approved code. The Code ensures a clear distinction is made between fumigation staff and other persons who may be present near the fumigation.
- 12.4.14 With these clear requirements in place the Committee's overall evaluation is that the level of risk to fumigation staff is negligible.

*Occupational bystanders working in the vicinity*

- 12.4.15 The Committee notes that non-fumigation staff working in the vicinity of a fumigation may be at risk during ventilation activities. The controls on methyl bromide require that fumigation staff must ensure that no person is present in an area where a gas concentration above the workplace exposure standard (WES) value is present, unless they are wearing appropriate respiratory protective equipment.
- 12.4.16 To achieve compliance with this requirement, the PMANZ Code recommends that fumigation staff establish an adequate risk area within which non-fumigation staff must not be present.
- 12.4.17 Taking these requirements into account, the Committee considers that the level of risk to occupational bystanders from the use of methyl bromide is negligible.

*Occupational bystanders unloading containers*

- 12.4.18 A potential risk to occupational bystanders relates to exposure of persons who are unloading goods from shipping containers due to the off-gassing of methyl bromide from fumigated goods. Employers must ensure that procedures are in place so that shipping containers are checked for gas concentrations if there is any risk that a concentration greater than the WES value may be present.
- 12.4.19 The controls require that appropriate RPE is worn to ensure that workers are not exposed to a concentration of methyl bromide which is greater than the WES. In this regard, the PMANZ Code recommends that appropriate respiratory protection (full face mask) is worn when spending long periods of time unloading containers. The Code also recommends that shipping containers should be vented for no less than two hours (using forced ventilation to circulate the air) before unloading is permitted.
- 12.4.20 The Committee considers that, with adherence to these controls the level of risk to occupational bystanders unloading containers is negligible.

**Risks to the public from the use of methyl bromide**

- 12.4.21 Adverse effects on the general public from exposure to methyl bromide may occur in relation to the ventilation of fumigations.
- 12.4.22 In relation to ventilation generally, the Committee notes that any risk of health effects relates to the distance that a member of the public may be from the activity and the atmospheric and weather conditions at the time.

- 12.4.23 The Committee considers that additional controls should be put in place requiring the use of minimum buffer zones to ensure the safety of members of the public. Additionally, the Committee considers that monitoring of gas concentrations reaching the edges of the buffer zones ought to be undertaken. These additional controls are discussed in Section 16 of this decision.
- 12.4.24 Some submitters expressed concern relating to the venting of small fumigations (such as a single shipping container). The Committee notes that this risk was addressed in the previous controls regime by a requirement that fumigations must be carried out at a place that is secured against ready access by unauthorised persons and not where a member of the public may legally be present. The Committee considers that this control should continue to be part of the revised management regime.
- 12.4.25 In addition, the Committee considers that shipping containers without recapture should only be ventilated in areas where they are able to comply with minimum buffer zone requirements, and that air quality monitoring should be carried out to ensure that the TELs are not being exceeded at locations where the public may be. These additional controls are discussed in Section 16 of this decision.
- 12.4.26 Overall, the Committee considers that, with the previous and additional controls in place, the level of risk to public health is *negligible*.

#### **Soil fumigation for biosecurity purposes (potato wart)**

- 12.4.27 The Committee learned during the submissions and hearing process that MAFBNZ requires methyl bromide as a soil fumigant to treat a particular fungal pest, potato wart, at a small number of mostly residential properties in the South Island. No detailed assessment of the methyl bromide exposures likely to result from this soil fumigation use was undertaken by the Agency. However, the Committee notes that use of methyl bromide in a residential area as a soil fumigant presents human health concerns, particularly as no stenching agent is used. For this reason, the Committee considers that procedures should be established to ensure that members of the public resident at the fumigated properties and, where appropriate, residents of neighbouring properties, are not exposed to the fumigant.
- 12.4.28 These procedures are discussed in Section 16.13 of this decision.

#### **Overview of risks to human health**

- 12.4.29 The Committee is satisfied that the potential adverse health effects associated with methyl bromide fumigation can be adequately managed by the extensive current controls together with improvements to the overall management regime which will provide greater assurance that the health and safety of workers and the general public is being protected. The improvements to the management regime are addressed in Section 16 of this decision.
- 12.4.30 The Committee notes that, as methyl bromide is an ozone-depleting substance, the release of the substance into the atmosphere will have indirect effects on human health. As discussed above, the international response to this matter has been the Montreal Protocol. The Committee's consideration of New Zealand's obligations under the Protocol appears in Section 14 of this decision.

## **12.5 Adverse effects on the environment**

- 12.5.1 The Committee notes that the use of methyl bromide as a fumigant will not result in direct exposure to plants, terrestrial or aquatic organisms. Furthermore, methyl bromide will quickly volatilise and dissipate in the atmosphere. Accordingly, the Committee agrees with the Agency's assessment that, due to a lack of direct exposure, significant ecotoxicological effects to plants, terrestrial or aquatic organisms are not expected.
- 12.5.2 Methyl bromide used as a soil fumigant at the appropriate concentrations will, as intended, eradicate all organisms in the soil environment. As non-QPS use of methyl bromide as a soil fumigant has been phased out, the risks associated with this use were not addressed in the application and have not been considered by the Committee.
- 12.5.3 The Committee notes that, as methyl bromide is an ozone-depleting substance, the release of the substance into the atmosphere will have indirect effects on the environment. As discussed above, the international response to this matter has been the Montreal Protocol. The Committee's consideration of New Zealand's obligations under the Protocol appears in Section 14 of this decision.

## **12.6 Adverse effects on the relationship of Māori to the environment**

### **Kaitiakitanga and Manaakitanga<sup>9</sup>**

- 12.6.1 Iwi/Māori submitters noted the role of methyl bromide in supporting their role as kaitiaki in the protection of taonga koiora (native species) and taonga tuku iho (other valued species). However, many also expressed concern about the unknown and/or unmeasured effects of the substance. They believe iwi/Māori needed more time to consider matters of relevance and felt it important that iwi/Māori in the immediate vicinity of fumigation activities be notified directly of any intended fumigation work.
- 12.6.2 The submission from Whareroa Marae, located opposite the port in Tauranga, expressed concern that cultural impacts posed by fumigation activities were not adequately accounted for. They believe it important that the Marae, associated kōhanga reo and kaumātua flats should be advised directly of any fumigation work so that they can take precautionary measures to ensure adverse cultural effects are minimised. The submission suggested that monitoring stations or equipment might be positioned on or near the Marae, kōhanga and associated kaumātua flats enabling them to participate in the regular monitoring of air quality.
- 12.6.3 The Committee, in considering these matters, agrees with the concerns raised about the ability of iwi/Māori in close proximity to fumigation areas to ensure cultural effects are minimised. This is of particular relevance in Tauranga, where a marae is opposite the port, in terms of their role in hosting manuhiri (visitors) and providing Manaakitanga (providing a safe and hospitable environment). Therefore, the Committee considers that fumigators should notify neighbouring properties in Tauranga, including Ngāti Kuku Hapū Environmental Unit and the community of Whareroa Marae, of intended fumigation activities. The Committee will instruct agency staff to assist to set up a process for the Port of Tauranga to notify Whareroa

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<sup>9</sup> *Custodianship and hospitality*

Marae of fumigations. The authority will seek confirmation that the process has been set up and is operating well within 12 months of this decision being released.

- 12.6.4 As the effects from methyl bromide upon Manaakitanga will have a *minimal* to *major* impact if no mitigating steps are taken, the Committee is requiring that fumigators must make appropriate notification arrangements with local Māori. With such arrangements in place, the Committee considers that a *moderate* effect would be *highly improbable* to occur. Thus the level of risk to Manaakitanga is assessed as *negligible*.

## 12.7 Adverse effects on society and communities

- 12.7.1 Adverse effects on society and communities are best described as effects caused by the concern about the potential for the adverse effects of methyl bromide fumigation. As evidenced by the Gulman petition, there is significant concern about the potential for adverse effects on human health. There is also public concern about the effects of methyl bromide on the global environment and the ozone layer.

- 12.7.2 Because of the significant level of public concern about the effects of methyl bromide fumigation, the Committee considers that requirements that will mean the public are better informed about fumigation activities and that provide greater assurance that the health of workers and the public is being protected should be imposed.

- 12.7.3 In this regard, the Committee considers that the following requirements will mitigate community concerns so that the level of risk is *negligible*. These requirements are the:

- monitoring and reporting on fumigation activities (see Sections 16.7 and 16.8);
- setting of minimum buffer zones between the fumigation site and members of the public (see Section 16.6); and
- public notification of large-scale fumigation activities (although in some circumstances such notification may be periodic rather than before each fumigation event) (see section 16.9).

- 12.7.4 In addition, the requirement for the introduction of recapture technology over the next 10 years will also mitigate community concerns.

## 12.8 Adverse effects on the market economy

- 12.8.1 In the reassessment application, the Agency identified the additional costs associated with adverse public reaction, for example having to do fumigation in alternative areas (different ports as well as different areas within a port); possible loss of jobs in a particular region (regional economic impact); and reduction in port throughput putting port viability at risk (regional economic impact) as having potentially significant adverse effects on the market economy from the continued use of methyl bromide.

- 12.8.2 The Committee acknowledges that, if methyl bromide continues to be used, there is the possibility that some regional and/or territorial authorities (district and city councils) may either ban or impose restrictions on the use of methyl bromide for log fumigation under covers using the provisions of the Resource Management Act 1991

(RMA), for example as part of the establishment of an air quality plan such as has been developed for Nelson.<sup>10</sup>

- 12.8.3 Bans or restrictions on the use of methyl bromide might result in a reduction in trade volumes for the port and a potential loss of jobs. This would be a regional effect, but not necessarily a national effect since the logs could potentially be taken to another port for fumigation, with equivalent increase in volume for that port and potential increase in employment. The main direct cost would be to the exporter. There would be a subsequent loss in export earnings as the cost of transferring the logs to alternative ports for treatment would increase exporters' costs and reduce their profit.
- 12.8.4 Thus, the continued use of methyl bromide could cause potentially significant adverse effects on the market economy resulting from public reaction to the use of methyl bromide causing changes in the use of methyl bromide at New Zealand's ports.
- 12.8.5 The Committee considers that the revised controls, including notification, monitoring, reporting and buffer zone requirements will mitigate community concerns as noted above. Accordingly, the Committee has concluded that the level of risk to the market economy is *negligible*.

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<sup>10</sup> Councils may need to justify a decision to restrict the use of methyl bromide on an effects basis that requires more stringent conditions than those associated with a national HSNO approval (see also sections 65, 68, 70A and 70B of the RMA).

## **13 Assessment of benefits**

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### **13.1 Summary**

13.1.1 The Committee's view, set out in more detail below, is that the continued use of methyl bromide has significant benefits for New Zealand, particularly in relation to the market economy. These benefits would not be fully realised if the substance was severely restricted in its use.

### **13.2 Introduction**

13.2.1 The Committee reviewed the Agency's assessment of the potential benefits associated with the use of methyl bromide in New Zealand, and discusses these in this section.

13.2.2 A "benefit" is defined in regulation 2 of the Methodology as "the value of a particular positive effect expressed in monetary or non-monetary terms". Benefits that may arise from any of the matters set out in clauses 9 and 11 of the Methodology are considered in terms of clause 13 of the Methodology.

13.2.3 In each case, the Committee's assessment includes a discussion of:

- whether the benefit is monetary or non-monetary (clause 13(a));
- an estimate of the magnitude of the benefit (clause 13(b)) and, where relevant, an assessment of the likelihood of occurrence;
- consideration of the uncertainty associated with the estimate (clauses 29 (materiality of uncertainty), 30 (need for caution where not resolved) and 32 (range of uncertainty));
- the distributional effects over time, space and groups in the community (clause 13(c)); and
- explicit consideration of the uncertainty bounds and how uncertainty affects the assessment of the benefits (clauses 29 – materiality of uncertainty; and 30 – the need for caution where uncertainty is not resolved).

13.2.4 As a basis for assessing the benefits, the Committee has considered the effects of the continued availability of methyl bromide in New Zealand.

### **13.3 The Committee's assessment of the positive effects of methyl bromide**

13.3.1 The following sections (13.4 to 13.8) set out the Committee's assessment of the positive effects of methyl bromide on:

- human health;
- the environment;
- the relationship of Māori to the environment;
- society and communities; and
- the market economy.

- 13.3.2 In conducting its assessment, the Committee followed the following steps:
- (a) identified the potentially significant effects that could occur in the areas listed in Section 13.3.1;
  - (b) assessed the level of risk taking into account the existing controls that apply to methyl bromide;
  - (c) revised the controls with a view to mitigating the level of risk; and
  - (d) assessed the level of risk taking into account the revised controls.

### **13.4 Human health benefits of the use of methyl bromide**

- 13.4.1 In relation to the human health benefits of the use of methyl bromide, the submission from the Ministry of Health stated the following:

*The Ministry of Health ... believes there is ample evidence that methyl bromide is an essential tool in the Ministry's strategy to exclude organisms of public health significance from New Zealand. The Ministry has articulated this view in its report to the Minister of Biosecurity, and since that report was rendered has had no cause to change its view that "a nationally coordinated approach to exclude exotic mosquitoes ... is crucial to protect public health".*

- 13.4.2 Thus the Committee considers that significant benefits for human health arise from the use of methyl bromide in the quarantine treatment of incoming goods to prevent the introduction of human disease vector organisms. If such organisms (such as particular species of mosquito) were introduced, very significant human health impacts could occur due to the transmission of diseases such as malaria, Ross River virus and dengue from a person infected with the relevant organisms. In addition, methyl bromide fumigation provides health benefits by preventing the establishment of exotic venomous spiders which would cause adverse health effects.

### **13.5 Environmental benefits**

- 13.5.1 The Committee notes the Agency's assessment that the impact of the introduction and establishment of an exotic pest/disease could have a major effect on the productive capability of the agricultural production system and natural ecosystems. This assessment is supported by submissions from MAFBNZ and Horticulture New Zealand.
- 13.5.2 MAFBNZ stated in their submission that some imported goods, such as bamboo or scrap metal, have such a high likelihood of harbouring unwanted organisms or they cannot be detected by visual inspection, that the goods are mandatorily fumigated with methyl bromide prior to clearance.
- 13.5.3 Horticulture New Zealand stated in their submission that methyl bromide is an important tool in relation to preventing pest incursions and their establishment and spread. They consider methyl bromide to be an important risk management tool.



## 13.6 Benefits to Māori

### Taha Ohanga<sup>11</sup>

- 13.6.1 In preparing the reassessment application, the Agency considered the impact methyl bromide has on the market economy generally and also sought views from iwi/Māori specifically on economic impacts given the growing size and nature of their asset and commercial base. A number of iwi/Māori and other submitters noted the importance of the continued availability of methyl bromide in terms of maintaining the sustainability of economic opportunities relating to forestry assets. Te Rūnanga o Ngāi Tahu noted that an immediate ban would have a significant adverse effect on the forestry sector and urges, along with several other submitters, the need for more prioritised research into alternatives. Carter Holt Harvey and MAF also noted that Māori interests in forestry assets are increasing and that methyl bromide provides a useful tool in maintaining the value of those assets. They also noted its importance in border control to ensuring the protection of native and valued species.
- 13.6.2 A report submitted by Joseph Stafford of Primal Communication provided some context and discussion around the potential socio-economic impacts for Māori of removing methyl bromide and notes that Māori interests in the forestry sector are significant. Māori are large forestry owners and significant forestry managers as well as having a proportionately significant percentage of constituents employed within the forestry industry and/or other service related industries. The report indicates the impact in terms of value to Māori forestry interests would be significant if methyl bromide (in the absence of a viable alternative) were removed.
- 13.6.3 A further key consideration discussed in the report builds on an issue raised during consultation identifying that in many cases the iwi/Māori groups benefiting from the use of methyl bromide (e.g. forestry owners) are not necessarily the ones carrying any cultural or other risks (e.g. iwi/Māori groups associated with ports).
- 13.6.4 Given that Māori forestry interests have increased significantly in recent years due to the return of assets through the Treaty settlements process, the Committee agrees that the economic benefits of retaining methyl bromide in the short to medium term are significant for iwi/Māori associated with those interests. This is partly due to the fact that Māori interests in this sector are relatively new and therefore very developmental in nature.
- 13.6.5 The Committee considers that a *moderate* positive effect from methyl bromide on the relationship of iwi/Māori to the environment and in their ongoing ability to develop economically is *likely* to occur. The corresponding level of benefit is therefore assessed to be *medium*.

## 13.7 Benefits to society and communities

- 13.7.1 The Committee did not identify any potentially significant positive effects on society and communities over and above the level of employment, and reduction of pests in agriculture. There may be social effects from the reduction of introduced pests which might have positive effects on society and community. However, the

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<sup>11</sup> *Opportunities*

Committee was not able to assess the nature or size of such benefits.

## 13.8 Market economy benefits

13.8.1 The Agency identified the economic benefits to New Zealand from trade as a significant positive effect on the market economy (see Section 5.6 and **Appendix K** of the reassessment application).

### Economic benefits associated with use of methyl bromide for imports

13.8.2 MAFBNZ have indicated that all risk goods entering New Zealand require clearance by MAFBNZ prior to leaving a MAF-approved facility to ensure that the goods do not harbour unwanted organisms. Some goods, such as bamboo or scrap metal, have such a high likelihood of harbouring unwanted organisms that the goods are mandatorily fumigated with methyl bromide prior to clearance. There are situations where the goods that have already been treated and certified offshore require retreatment on arrival due to detection of quarantine pests. Currently, the most effective treatment available is methyl bromide.

13.8.3 Incursions are also detected after goods have been given clearance. In the majority of cases, methyl bromide is considered to be the most effective treatment and in some cases the only effective treatment.

13.8.4 The estimated impact on the economy of biosecurity breaches involving pests and diseases that can be associated with imported goods requiring fumigation is shown in Table 13.1.

**Table 13.1: Estimates of impacts for biosecurity breaches<sup>12</sup>**

Economic impact assessment of exotic pests	Year	Period (Years)	PV of total impact (\$m)	Assessed annual impact (\$m)	PV of total impact as at Jun 09 (\$m)	Annual impact as at Jun 09 (\$m)
Red imported fire ant	2001	23	665.0	74.9	820.6	83.1
Painted apple moth	2002	20	157.2	18.5	188.8	56.9
Gum leaf skeletoniser	2003	39	156	16	184.6	16.0
Fall web worm	2003	21	35.5	4.1	42.0	4.9
Asian gypsy moth	2004	50	114.4	11.5	132.2	13.3
Dutch elm disease	2004	13	111.0	15.6	128.4	19.7
Clover root weevil	2005	35	3800.0	394.0	4107.8	547.7
<b>Total impact (excluding clover root weevil)</b>					1496.6	193.9
<b>Total impact (all pests)</b>					5604.4	741.6

Source: MAFBNZ

<sup>12</sup> This table shows the total present value (PV) cost in dollars of impact, and the same value assessed as a constant value of impact over the study period. The annual PV at Jun 09 column shows the figures adjusted to June 2009 using the Consumer Price Index.

- 13.8.5 The New Zealand Fresh Produce Importers Association (NZFPIA) indicated that imported fresh produce contributes to both the economy and health outcomes. The year round supply of high-quality produce at reasonable prices flows through to all New Zealand households. The NZFPIA maintains that the on-arrival contingency availability of methyl bromide is important to the year-round continuity and certainty of supply.

**Economic benefits associated with use of methyl bromide for exports**

- 13.8.6 As explained in MAFBNZ's submission, many countries officially require particular products to undergo mandatory fumigation prior to export, e.g. apples to Japan or logs to China and India. The trade cannot occur without a treatment that is officially recognised by the importing country. In many situations the only treatment accepted by an overseas country is methyl bromide. In some situations, like with logs to China, phosphine is an option for the product below the deck (approximately two thirds of all logs); however, the remaining third of the logs on the top deck still have to undergo mandatory fumigation with methyl bromide in New Zealand.
- 13.8.7 Between 72% and 80% of the total methyl bromide used in New Zealand is for fumigation of export forestry products, mainly logs and sawn timber for pre-export quarantine treatment to meet the importing country's phytosanitary requirements. The volume of methyl bromide used is directly linked to trade volumes and overseas regulations.
- 13.8.8 New Zealand's trading partners that require fumigation of logs and/or sawn timber with methyl bromide are Australia, China, India, Malaysia, Thailand, Papua New Guinea and the Philippines.
- 13.8.9 The value of annual forest exports to countries requiring fumigation with methyl bromide prior to shipment exceeded \$1.2 billion as at June 2009 (the most recent figure available).
- 13.8.10 Log exports to the two biggest markets, China and India, have increased significantly over the last 14 years with the most significant growth in the last five years. Since 2000/01 the volume of log exports to China more than tripled with the average growth rate higher than 36% per annum and the value of log exports reaching nearly \$425 million in the 2008/09 financial year.
- 13.8.11 The volume of log exports to India has been growing at an average rate of 18% per annum with the value of log exports exceeding \$62 million per annum by the end of the 2008/09 financial year.
- 13.8.12 Based on MAFBNZ's forecast of the volumes of logs available for export in the next decade and the growth trend of log exports to main markets, it is estimated that by 2014/15 the volume of log exports to China and India may exceed 12.5 million cubic metres from the current 4.2 million cubic metres.
- 13.8.13 Australia requires fumigation of sawn timber during the summer months. Although sawn timber exports to Australia have been decreasing in the last five years, the value of solid wood exports to Australia was still in excess of \$147 million in 2008/09.

- 13.8.14 It is MAFBNZ's view that New Zealand's economic and social prosperity to a great extent depends on its international trade and access to key agricultural and forestry export markets. Agricultural and forestry exports constituted 57.7% (\$24.8 billion) of a total \$43 billion of New Zealand merchandise exports in 2008/09.
- 13.8.15 While MAFBNZ has concentrated on the value of the use of methyl bromide for timber exports, areas such as horticulture are also important and loss of ability to use methyl bromide would mean that some markets would be lost with significant adverse effects on individual growers and the horticultural industry as a whole. For example, Australia requires that all imports of tomatoes and capsicum from New Zealand are treated with methyl bromide.
- 13.8.16 Horticulture New Zealand represents 7,000 commercial fruit and vegetable growers and indicated that the industry employs some 50,000 people in the peak periods. Horticulture exports contributed more than \$3.1 billion to the New Zealand economy in 2008, representing 4.7% of the total merchandise exported from New Zealand. Horticulture New Zealand indicated that methyl bromide plays a small but important role in facilitating horticulture exports and managing biosecurity.
- 13.8.17 Several countries require pre-export fumigation of New Zealand produce. These include significant markets such as Australia, Fiji, French Polynesia, India, Japan and South Africa.
- 13.8.18 Methyl bromide soil fumigation also plays an important role in ensuring that New Zealand potato growers have access to overseas markets that require assurance the potatoes are free from potato wart.

**Summary of assessment of benefits to the market economy**

- 13.8.19 The Committee considers there is a major economic benefit in terms of preventing unwanted organisms entering New Zealand and allowing access to overseas markets for forestry and horticultural products as a result of the availability of methyl bromide.

## 14 International obligations

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- 14.1.1 Section 6(f) of the Act requires the Committee to take into account New Zealand's international obligations.
- 14.1.2 As discussed above, New Zealand has an obligation under the Montreal Protocol to  
*refrain from use of methyl bromide and to use non-ozone-depleting technologies wherever possible. Where methyl bromide is used, Parties are urged to minimise emissions and use of methyl bromide through containment and recovery and recycling methodologies to the extent possible;*
- 14.1.3 Ozone layer depletion results in an increased incidence of human disease, in particular, skin cancer, cataracts and immune suppression due to the increased exposure to ultraviolet (UV) radiation experienced by the population. A guide recently published by the World Health Organization<sup>13</sup> indicates that some 220 deaths in New Zealand in 2002 were attributable to exposure to ultraviolet radiation.
- 14.1.4 The Committee also notes that there is public concern about the effects of ozone layer depletion on human health and the environment and also concern that New Zealand is not following the recommendations of the Montreal Protocol so is not fulfilling its international obligations.
- 14.1.5 The Committee notes that, while New Zealand is meeting its obligations under the Montreal Protocol, it is desirable to move to limiting the amount of methyl bromide used and to reduce the amount of the gas that is discharged into the atmosphere. Accordingly, the Committee considers that recapture technology should be introduced as soon as practical and affordable and definitely within a 10-year timeframe.
- 14.1.6 For further discussion on recapture technology, see Section 16.11.

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<sup>13</sup> Lucas R. *Solar ultraviolet radiation: Assessing the environmental burden of disease at national and local levels*. Prüss-Ustün A and Perkins van Deventer E, eds. Geneva, World Health Organization, 2010 (Environmental Burden of Disease Series, No. 17).

## 15 Scenarios

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- 15.1.1 Risk-benefit analysis is used to assess the adverse and positive effects. Risk-benefit analysis is a comparative tool; thus the results of the assessment of risks and benefits for one option need to be compared against one or more alternative options.
- 15.1.2 In Sections 12 and 13 of this decision, the Committee has evaluated the adverse and positive effects associated with the continued availability of methyl bromide.
- 15.1.3 The Committee considers that the continued availability of methyl bromide has significant benefits to New Zealand's economy; to the relationship of Māori with the environment; to the environment; and to public health.
- 15.1.4 The Committee considers that these benefits would be lost if an immediate ban on the use of methyl bromide was adopted.
- 15.1.5 The Committee also considers that the benefits would be severely diminished if a phase out of methyl bromide use in five years was adopted as it is unlikely that alternative treatments or changes in requirements of New Zealand's trading partners could be established in that timeframe.
- 15.1.6 Accordingly, the Committee considers that the continued import and use of methyl bromide should be approved with modifications to the controls regime as described in Section 16 and set out in **Appendix C**.

## **16 Revised management regime**

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### **16.1 Introduction**

- 16.1.1 Fumigation activities using methyl bromide involve risks to the health of operators, occupational bystanders and the general public. They are also the subject of significant public concern and anxiety in some places.
- 16.1.2 The Committee is satisfied that, while adverse health effects associated with methyl bromide fumigation can be adequately managed by the previous controls, improvements to the overall management regime should be made to provide greater assurance that the health and safety of workers and the general public is protected. These measures are outlined in this section.
- 16.1.3 Accordingly, the Committee has strengthened the previous controls and added new ones to further mitigate the risks involved in methyl bromide fumigations. These include:
- setting revised tolerable exposure limits (TELs) for methyl bromide;
  - requiring air quality monitoring;
  - requiring regular reporting on fumigation activities;
  - setting minimum buffer zones; and
  - requiring notification of fumigations.
- 16.1.4 The Committee also notes that, as an ozone depleting substance, methyl bromide causes indirect effects on public health and the environment. To address these effects, the Committee is requiring all methyl bromide fumigations to be subject to recapture technology within 10 years.
- 16.1.5 During the hearing the Committee was informed that unstenched methyl bromide is required by MAFBNZ as a soil fumigant used for biosecurity purposes to control potato wart, most commonly in residential areas. Accordingly, some specific controls have been added to the use of methyl bromide for this remaining soil fumigation use.
- 16.1.6 In addition, the Committee strongly recommends that more research is undertaken into alternative methods of treatment, reducing the amount of methyl bromide required, and recapture and disposal of methyl bromide.
- 16.1.7 In order to monitor the progress of the introduction of recapture technology; the Committee will require all fumigators using methyl bromide to submit an annual report to the Agency outlining the progress that they are making in introducing recapture technology.

### **16.2 Strengthening controls**

- 16.2.1 The Committee has determined that the controls attached to methyl bromide are those prescribed by the regulations made under the Act and which are assigned to methyl bromide on the basis of its hazard classification.

- 16.2.2 Under section 77(3), (4) and (5), the default controls determined by the hazardous properties of the substance may be varied (substituted, added, or deleted) in certain circumstances, taking into account whether the adverse effects are greater or less than the adverse effects normally associated with substances given the same hazard classifications. In substituting or deleting controls, the adverse effects of the substance must not be significantly increased.
- 16.2.3 Under section 77A, the Committee may impose as controls any obligations and restrictions that it thinks fit. Before imposing a control under this section, the Committee must be satisfied that, against any other specified controls that apply to the substance:
- (a) the proposed control is more effective in terms of its effect on the management, use and risks of the substance; or
  - (b) the proposed control is more cost-effective in terms of its effect on the management, use and risks of the substance; or
  - (c) the proposed control is more likely to achieve its purpose.
- 16.2.4 The full set of controls which apply to methyl bromide are set out in **Appendix C**, Tables 1 to 4. This section of the decision contains a discussion of the changes (additions, substitutions, variations and deletions) made to the controls as part of the consideration of this application for reassessment of methyl bromide.

### **16.3 Approved handler**

- 16.3.1 Methyl bromide is required to be under the personal control of an approved handler. As suitably qualified people should be able to handle methyl bromide during transport, the following exception to the approved handler requirements is added under section 77A.

*Exception to approved handler requirement for transportation of methyl bromide*

*(1) Regulation 9 is deemed to be complied with if—*

- (a) in the case of methyl bromide being transported on land,—*
  - (i) if by rail, the person who drives the rail vehicle that is transporting the methyl bromide is fully trained in accordance with the approved safety system for the time being approved under section 6D of the Transport Services Licensing Act 1989; and*
  - (ii) in every other case, the person who drives, loads, and unloads the vehicle that is transporting the methyl bromide has a current dangerous goods endorsement on his or her driver licence; and*
  - (iii) in all cases, Land Transport Rule: Dangerous Goods 2005 (Rule 45001) is complied with; or*
- (b) in the case of methyl bromide being transported by sea, one of the following is complied with:*
  - (i) Maritime Rules: Part 24A – Carriage of Cargoes – Dangerous Goods; or*
  - (ii) International Maritime Dangerous Goods Code.*

### **16.4 Controlled substance licence**

- 16.4.1 The Committee notes that methyl bromide and other fumigants currently approved under the Act were approved with an additional control requiring controlled



substance licences, and considers it appropriate that this control should continue to apply to methyl bromide.

- 16.4.2 Accordingly a person must not possess methyl bromide unless that person has a valid licence for methyl bromide issued pursuant to section 95B of the Act.
- 16.4.3 However, a person may possess methyl bromide without a licence if another person has such a licence and is present and available immediately.
- 16.4.4 The exception to the approved handler requirements set out in Section 16.3.1 also applies to the licensing requirements.

## **16.5 Setting of exposure limits for methyl bromide**

### **Tolerable exposure limits (TELs)**

- 16.5.1 The previous controls on methyl bromide included a tolerable exposure limit (TEL) of  
 $TEL_{\text{air}} = 0.0013 \text{ ppm (0.005 mg/m}^3\text{)}$ .
- 16.5.2 This TEL is a chronic value derived on the basis that a person exposed to no more than the chronic TEL for a lifetime would not suffer adverse health effects. While the TEL (chronic) is designed to protect a member of the public from a hazardous concentration over a lifetime of exposure, the Committee considers that methyl bromide concentrations should be calculated on an annual basis in order to enable comparison against the TEL (chronic) in a meaningful timeframe.
- 16.5.3 The Committee also considers that both a 1 hour TEL and a 24 hour TEL should be set to assess acute exposures. This is because there is a chance that members of the public might be exposed to high concentrations of methyl bromide over a short period without the chronic (lifetime) TEL being exceeded.
- 16.5.4 The 1 hour TEL and 24 hour TEL values are concentrations of methyl bromide in air which are not allowed to be exceeded over the stated averaging period. A member of the public would need to be exposed to the gas concentration for the relevant period of time (1 hour or 24 hours respectively) before any adverse effect on health could potentially occur.
- 16.5.5 Accordingly, in accordance with section 77B, the Committee has set the following TELs:
- $TEL_{\text{air}}$  (chronic, annual average): 0.0013 ppm (0.005 mg/m<sup>3</sup>)
  - $TEL_{\text{air}}$  (24 hour): 0.333 ppm (1.3 mg/m<sup>3</sup>)
  - $TEL_{\text{air}}$  (1 hour): 1 ppm (3.9 mg/m<sup>3</sup>).
- 16.5.6 In imposing these TELs, the Committee notes that:
- they have considered the best international practices and have adopted international values as described below; and
  - people affected by the imposition of these limits have been advised of them in the Agency's application and given the opportunity to comment on them during the public submission period.

## Basis for the TELs

### (a) Chronic (lifetime) TEL

16.5.7 A chronic (lifetime) duration TEL of 0.0013 ppm (0.005 mg/m<sup>3</sup>) was established for methyl bromide when it was transferred to the framework of the HSNO Act. The TEL was amended by the Authority in 2007 around the time of the hearing in the Environment Court into the Nelson City Council Air Quality Plan under the RMA, when the Ministry of Health drew attention to uncertainty as to whether the TEL in the notice included a time weighting or was effectively a ceiling limit. The amendment under section 67A of the Act clarified that the level is for chronic exposure.

16.5.8 The basis of this value is the adoption of the chronic reference concentration (RfC) established by the US EPA (US EPA, 2008<sup>14</sup>). The chronic reference value was derived based on the need to protect humans from degenerative and hyperplastic lesions in the nasal epithelium.

### (b) TEL (1 hour)

16.5.9 The 1 hour TEL is based on the permissible exposure limit (PEL) set by the Office of Environmental Health Hazard Assessment (OEHHA) of California. The value was current as at 2008 (OEHHA, 2008)<sup>15</sup>.

16.5.10 The derivation of the value was based on a lowest observed adverse effect level (LOAEL) in a human population of 90 workers (OEHHA, 2008). The uncertainty factors applied were 1 for inter-species uncertainty (since it was based on human data) and an intra-species uncertainty factor of 10 (the standard value). An additional uncertainty factor of 6 was applied due to the use of a LOAEL rather than a no observed adverse effect level (NOAEL). This takes account of the mild adverse effects reported in the exposed population.

### (c) TEL (24 hour)

16.5.11 The basis of this value is the adoption of the acute (24 hour) reference concentration (RfC) established by the US EPA (US EPA, 2008<sup>16</sup>). The acute reference value was derived based on the need to protect humans from developmental toxicity.

## Workplace exposure standard (WES)

16.5.12 The Committee notes that the Department of Labour (DOL) is reviewing the WES value for methyl bromide which is also the current HSNO WES. The WES value has been set by reference to the DOL publication of 2010<sup>17</sup>, but is unchanged from what previously applied. The Committee considers that any modified WES value set by the DOL should be adopted as a HSNO WES.

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<sup>14</sup> US EPA, 2008. —Reregistration Eligibility Decision (RED) for Methyl Bromide. U.S. Environmental Protection Agency, Office of Pesticide Programs, Health Effects Division (7509P). EPA 738-R-08-005.

<sup>15</sup> OEHHA, 2008: 1 hour REL for methyl bromide. [www.oehha.ca.gov/air/hot\\_spots/2008/AppendixD2\\_final.pdf#page=166](http://www.oehha.ca.gov/air/hot_spots/2008/AppendixD2_final.pdf#page=166) (p170).

<sup>16</sup> US EPA, 2008. —Reregistration Eligibility Decision (RED) for Methyl Bromide. U.S. Environmental Protection Agency, Office of Pesticide Programs, Health Effects Division (7509P). EPA 738-R-08-005.

<sup>17</sup> "Workplace Exposure Standards and Biological Exposure Indices Effective 2010" published by the Department of Labour, September 2010, ISBN 978-0-478-36002-8. Also available at [www.osh.dol.govt.nz/order/catalogue/pdf/wes2010.pdf](http://www.osh.dol.govt.nz/order/catalogue/pdf/wes2010.pdf).

### **Environmental exposure limits**

16.5.13 The default controls include requirements to limit exposure of non-target organisms in the environment through the setting of environmental exposure limits (EELs). The Authority is reviewing the setting of EELs. As this review has not been completed, no EELs are being set for methyl bromide and the default values have been deleted.

### **16.6 Minimum buffer zones**

16.6.1 As discussed above, the Committee has set 1 hour, 24 hour and chronic (annual average) TELs.

16.6.2 As compliance with the TELs is critical in ensuring that impacts upon public health resulting from methyl bromide exposure do not occur, the Committee is also requiring that the person in charge of a site where methyl bromide is applied and the person using methyl bromide must establish buffer zones around the fumigations.

16.6.3 A buffer zone is an area around a methyl bromide fumigation where the public is not permitted to be present.

16.6.4 Based on air quality monitoring data, minimum buffer zones for fumigations were proposed in the Agency's update paper. The Agency considered that adoption of these minimum buffer zones should mean that the 1 hour TEL is achieved on the majority of occasions.

16.6.5 The Committee has agreed to impose the buffer zones recommended by the Agency with the exception of reducing the buffer zone for single container fumigation.

16.6.6 The Committee notes that the Agency originally proposed a 25 m buffer zone for a single container fumigation. However, data provided by Genera Ltd for single container fumigations showed that, over a range of weather conditions at a number of different sites, instantaneous concentrations of methyl bromide varied between 0.0 and 2.3 ppm at a distance of 4 m away from the container, and were nearly always zero at 12 m away.

16.6.7 The data provided by Genera Ltd indicate that 1-hour exposures 12 m from a container should be well below the 1-hour TEL and in most cases close to zero. On the basis of these monitoring data, the Committee considers that a minimum 10 m buffer zone for ventilating containers should mean that members of the public would be very unlikely to be exposed to concentrations in exceedance of the 1-hour TEL.

16.6.8 Accordingly, the Committee considers that the following minimum buffer zones should apply from the source of the release of methyl bromide.

**Table 16.1: Minimum buffer zones**

Use	Minimum buffer zones (in metres)
Ship's hold (1000 kg or more of methyl bromide applied per site in any 24 hour period)	100
Ship's hold (less than 1000 kg methyl bromide applied per site in any 24 hour period)	50
Fumigation under sheets	50
Containers (total volume of 77 m <sup>3</sup> or more in any 60-minute period)	25
Containers (total volume of less than 77 m <sup>3</sup> in any 60-minute period)	10

- 16.6.9 Wind direction frequently changes; therefore the minimum buffer zones shall apply in all directions.
- 16.6.10 Where a buffer zone extends over water, the person in charge of the site and any person who uses methyl bromide must take all practicable steps to ensure that the water is monitored and, if a member of the public enters the buffer zone, that the person moves out of the buffer zone as soon as practicable.
- 16.6.11 A minimum buffer zone shall apply until such time as air quality monitoring has demonstrated that the concentration in the air has been below 0.05 ppm for 15 minutes where 7 kg or more of methyl bromide has been applied in a 1-hour period; or 3 minutes where less than 7 kg of methyl bromide has been applied in a 1-hour period.

#### **Sensitive sites**

- 16.6.12 The Committee considers that QPS fumigations, other than soil fumigations, using methyl bromide should not be carried out within 25 m of any sensitive site where the public may lawfully be present. Sensitive sites include schools, playgrounds, early childhood centres, prisons, hospitals or long-term care facilities where members of the public who may be unable to evacuate themselves could be present.

#### **Signage**

- 16.6.13 The Committee considers that a person who applies methyl bromide must ensure that signs are displayed at every point of access to the buffer zone. These signs must:
- state that fumigation is being carried out; and*
  - state that methyl bromide is being used; and*
  - state that methyl bromide is toxic to humans; and*
  - describe the general type of hazard associated with methyl bromide; and*
  - describe the precautions necessary to prevent unintended ignition of methyl bromide; and*
  - comply with regulation 34(1), (2), and (4), and regulation 35(1), (3), and (5) of the Hazardous Substances (Identification) Regulations 2001, but as if the*

*distances referred to in regulation 35(3) were a distance of not less than 10 metres; and*

- (g) identify the person in charge of the site and provide sufficient information to enable the person to be contacted during normal business hours; and*
- (h) state the date on which the fumigation commenced; and*
- (i) be illuminated during the hours of darkness; and*
- (j) be able to be readily seen by a person approaching the buffer zone, including, when applicable, persons approaching from a seaward direction.*

16.6.14 The signs must be removed at the end of the buffer zone period.

#### **Alternative buffer zones**

16.6.15 The Committee notes that the minimum buffer zones may pose significant challenges for persons who apply methyl bromide with limited space for their operations and that persons who apply methyl bromide may have alternative procedures in place at a site to ensure that the TEL values can be adhered to without them.

16.6.16 Thus, the Committee considers that alternative buffer zones may be established by a person in charge of a site where methyl bromide is applied through compliance with a code of practice approved by the Authority where it can be unequivocally shown that following the code of practice will ensure compliance with the TEL values.

#### **Recapture and buffer zones**

16.6.17 The Committee considers that the minimum buffer zone requirements should not apply when recapture technology is in place as recapture technology (as defined in Section 16.11 below) is a proven way of reducing exposures.

#### **Local requirements for buffer zones**

16.6.18 The buffer zones are to be considered as minimum distances. The Committee notes that there may be periods (for example, during unfavourable meteorological conditions for pollutant dispersion) when either larger buffer zones or alternative controls are required to meet the TEL values. It is, therefore, the responsibility of the person who applies methyl bromide and the person in charge of the site to ensure that appropriate controls are in place so that TELs are not exceeded. If there is site-specific information which suggests that further controls are required in order to achieve the TELs then these must be put in place. An exceedance of any TEL value cannot be deemed acceptable even if the minimum buffer zone requirements have been met.

16.6.19 The Committee notes the concerns of Nelson City Council which suggested that the minimum buffer zones proposed in the reassessment application may conflict with local requirements under the RMA. It is very important to emphasise that these minimum buffer zones do not preclude regional councils, unitary authorities or port authorities from setting more stringent controls (e.g. larger buffer zones) if they deem them necessary because of local conditions. The Committee notes that section 142(3) of the Act specifically envisages situations where a local authority may choose to impose more stringent requirements on the use of a hazardous substance than that required under the Act.

### **Prohibition on the use of methyl bromide in excess of a tolerable exposure limit**

- 16.6.20 As the TELs must not be exceeded at the boundary of the buffer zone, the control relating to exceeding TELs is varied under section 77A to read:

*A person in charge of a site and a person who uses methyl bromide must ensure that methyl bromide is used in a manner that does not result in a concentration of methyl bromide, in air at the boundary of the buffer zone, that exceeds the TEL<sub>air</sub> values.*

### **16.7 Air quality monitoring**

- 16.7.1 In addition to requiring minimum buffer zones be adhered to, the Committee considers that air quality monitoring should be carried out to demonstrate compliance with the TEL values.

#### **Fumigation size and air quality monitoring**

- 16.7.2 The Committee notes the significant difference in the emission profiles of small fumigations carried out in containers and larger fumigations, for example, those carried out in ship holds. In addition, the Committee notes the concerns raised by some submitters about the practicalities involved with carrying out extensive air quality monitoring around all fumigations in particular those involving small amounts of methyl bromide. As a consequence, the Committee considers it appropriate to have different monitoring procedures for fumigations involving different amounts of methyl bromide.

#### **Procedures for air quality monitoring using over 7 kg methyl bromide/hour**

- 16.7.3 The Committee expects the vast majority of exposure to normally occur during the ventilation of the fumigation. Therefore, air quality monitoring should begin at the start of all ventilations. Monitoring shall occur in the downwind direction at the edge of the buffer zone (i.e. the location where members of the public could be present). Monitoring shall continue until the concentration of methyl bromide remains below 0.05 ppm (which is effectively the limit of detection for most photo-ionisation detectors (PIDs)) for at least 15 minutes.
- 16.7.4 Where the edge of the buffer zone in the downwind direction is over water, the monitoring location should be the point on land at the edge of the buffer zone that is in the most downwind direction from the enclosed space being ventilated
- 16.7.5 The results of the air quality monitoring along with information about the fumigation (e.g. type and amount of methyl bromide used) and weather conditions must be recorded.

#### **Air quality monitoring around fumigations using less than 7 kg methyl bromide per hour**

- 16.7.6 The minimum requirement for air quality monitoring for fumigations involving less than 7 kg methyl bromide per hour is for sampling to be undertaken in the downwind direction at the edge of the buffer zone. This monitoring is to begin at the start of the ventilation and shall continue for 3-minute intervals until the gas is not detectable (a concentration of < 0.05 ppm).

- 16.7.7 This monitoring is intended to complement air quality monitoring to check for leaks and compliance with the WES value which the Committee understands already takes place during the fumigation of many containers.
- 16.7.8 The results of the air quality monitoring along with information about the fumigation (e.g. type and amount of methyl bromide used) and weather conditions must be recorded.

#### **Air quality monitoring results**

- 16.7.9 The Committee considers that data recorded from the air quality monitoring shall then be averaged so that appropriate comparisons can be made with the 1 hour, 24 hour and the chronic (annual average) TEL values.
- 16.7.10 The chronic annual average TEL value should be calculated by establishing the highest recorded concentration at each location for each day of the year and assuming that when ventilation is not occurring the concentration is zero.
- 16.7.11 The Committee notes the possibility that more than one person who applies methyl bromide may be operating at individual sites over the course of a year. It is the responsibility of the person in charge of the site to collate the data to ensure that all monitoring data are compared to the appropriate TEL value. The chronic average value will be the average over the whole year.
- 16.7.12 The Committee agrees with the submitters who wished to see both the 1 hour and 24 hour TELs applied as running averages as this presents a more precautionary view of the monitoring data. These running averages must be reported in the annual monitoring report if one is required for the site.
- 16.7.13 The Committee requires that the person in charge of a site keep the monitoring records of all fumigations for seven years.

#### **Compliance with the 24 hour and annual average TEL**

- 16.7.14 The Committee expects the person in charge of the site to be continuously and proactively calculating the 24 hour or annual average TEL value. This sort of analysis should allow persons who apply methyl bromide to ensure that they do not exceed either of these values. If the person in charge of the site establishes that they are close to either of these values, they should take extra steps (such as larger buffer zones or controlled venting) to ensure that future fumigations do not release sufficient methyl bromide to cause the relevant TEL to be exceeded. If either of these values is exceeded no further fumigations may take place for the remainder of the period over which concentrations are being averaged (i.e. over the day or the year) unless recapture technology is used.

#### **Recapture and air quality monitoring**

- 16.7.15 Although the Committee accepts that fumigations which use recapture technology will still release some methyl bromide, the emissions would be expected to be significantly lower than fumigations which do not employ recapture technology. As a consequence the requirement to carry out air quality monitoring should not apply when recapture technology is used. The Committee understands that operational testing to verify recapture performance and lack of leakage is already carried out when recapture technology is used and recommends that this testing continues.

### Reporting of TEL exceedances

- 16.7.16 The Committee requires that the person in charge of the site inform the relevant Medical Officer of Health and the Department of Labour of any breaches of any TEL values as soon as practicable, but within five working days.

### Monitoring guidance and code of practice

- 16.7.17 The Committee strongly recommends that monitoring should adhere to the Ministry for the Environment “Good practice guide for air quality monitoring and data management 2009”<sup>18</sup> and air quality monitors should be located in accordance with AS/NZS35801.1.2007 Methods for sampling and analysis of ambient air: Part 1.1 Guide to siting air monitoring equipment.<sup>19</sup>
- 16.7.18 The Committee also strongly recommends that Stakeholders in Methyl Bromide Reduction (STIMBR) submit a revised version of their monitoring protocol (incorporating the changes resulting from this decision) to the Authority for consideration as a HSNO approved code of practice.

### Requirements for record keeping

- 16.7.19 To give effect to the monitoring requirements set out above, the default control requirements to keep records are replaced under section 77A by the “Collecting data” controls set out in clause 2 of Table 2 in **Appendix C**.

## 16.8 Reporting of monitoring data

- 16.8.1 The Committee appreciates that there is considerable public concern regarding the potential adverse health effects of methyl bromide. In addition, many submitters expressed concern about the independence and quality of the air quality monitoring. As a consequence, the Committee considers that there should be procedures in place to ensure that the monitoring methodology and results are made publicly available.
- 16.8.2 To help reassure local communities, the Committee requires the person in charge of a site using over 500 kg/year of methyl bromide to prepare an annual report outlining their air quality monitoring results.
- 16.8.3 This requirement to produce an annual report outlining air quality monitoring does not apply to fumigations where methyl bromide is being recaptured.
- 16.8.4 The annual report must include:
- *the number of fumigations using methyl bromide carried out at the site;*
  - *the total amount of methyl bromide applied at the site;*
  - *the type of enclosed spaces being fumigated;*
  - *the types of equipment used to carry out the monitoring;*
  - *the annual exposure level;*

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<sup>18</sup> Ministry for the Environment “Good practice guide for air quality monitoring and data management 2009 available online at [www.mfe.govt.nz/publications/air/good-practice-guide-air-quality-2009/](http://www.mfe.govt.nz/publications/air/good-practice-guide-air-quality-2009/)

<sup>19</sup> AS/NZS35801.1.2007 Methods for sampling and analysis of ambient air: Part 1.1 Guide to siting air monitoring equipment



- *how many times the exposure levels exceeded the TEL<sub>air</sub> value;*
- *the number of notifications of breaches of any TEL values made to the Medical Officer of Health and the Department of Labour;*
- *if any breach of a TEL<sub>air</sub> occurred,*
  - *a discussion of possible causes of each breach; and*
  - *an explanation of what measures will be taken to ensure that TELs will be complied with in the future.*
- *any accidents or other issues related to non-compliance with any controls under this approval including an estimate of the approximate total amount of methyl bromide accidentally discharged.*

16.8.5 This monitoring report is to be based on the calendar year (1 January to 31 December) and be submitted to ERMA New Zealand, the Department of Labour and the relevant Medical Officer of Health by 30 June of the following year. ERMA New Zealand will publish the reports on its website so they can be accessed by any member of the public.

## **16.9 Notification of fumigations**

16.9.1 The Committee agreed that, due to submitters' concerns around the accidental release or intentional venting of fumigations, notification of neighbouring property owners and occupiers should be required for fumigations. This notification is additional to the notification of the New Zealand Fire Service and the person in charge of the site.

16.9.2 It is the responsibility of the person who applies methyl bromide to ensure that the notification in writing occurs, but the actual notification can be done by someone on their behalf (such as the person in charge of the port or transitional facility).

16.9.3 The notification should be made:

- at least 24 hours prior to the start of the fumigation;
- where recapture technology is not used, to the occupants of each property, within 25 m of the site to where the fumigation is to take place; and
- where recapture technology is not used, to the occupants of each property, including moored boats, within 100 m of the fumigation when more than 100 kg of methyl bromide is intended to be used.

16.9.4 The Committee recognises that, for some locations, the above requirement would be impractical as one or more notifications may be required on most days of the year based on the frequency of the activity. To address this more regular fumigation activity, the Committee proposes that where a fumigation company or site is involved in regular fumigation (at least weekly) involving the relevant quantities per day, the notification can be made as follows:

- The fumigation company or the person in charge of the site where the activity occurs can provide an annual written notification by letter/leaflet to each occupier/land owner prior to the fumigations occurring identifying:
  - where the fumigation activities will occur;
  - the time at which ventilation normally occurs (if this can be specified);

- the expected frequency of fumigation, and
- any likely seasonal trends.

## **16.10 Additional controls relating to methyl bromide**

16.10.1 Several new controls, additional to the default controls, were applied to methyl bromide when it was approved under the Act. The Committee considers that it is appropriate to adopt these controls for methyl bromide, with some modifications. The additional controls applied under section 77A are:

### **Restriction on fumigation**

16.10.2 A person may only apply methyl bromide into a container, under a sheet or into a ship's hold.

### **Controls relating to the adverse effects of unintended ignition**

16.10.3 The controls set out in Schedule 10 of the Hazardous Substances (Dangerous Goods and Scheduled Toxic Substances) Transfer Notice 2004 apply to methyl bromide.

### **Site must be secured**

16.10.4 Fumigation may only be carried out in a place that is secured against ready access by unauthorised persons.

### **Container must not be moved during fumigation**

16.10.5 A person must not move a container during fumigation other than from a wharf to a ship that is berthed at that wharf; or from a ship to a wharf where that ship is berthed.

### **Container must be gas tight**

16.10.6 A person may not apply methyl bromide in a container unless the container is in good repair and capable of being securely closed and the container does not leak at any of the temperatures and/or pressures to which the container will be made subject.

### **Requirements for sheets**

16.10.7 A person must not apply methyl bromide under sheets unless the sheet is in good repair without tears, rips or visible holes, is made secure against likely weather conditions at the site and is sealed with a border that is filled with heavy material.

## **16.11 Recapture**

16.11.1 For the reasons set out in the following paragraphs, the Committee is requiring that all methyl bromide fumigations be subject to recapture technology within 10 years.

16.11.2 A 10-year timeframe has been chosen to allow for development, acquisition and installation of suitable equipment.

16.11.3 However, it is noted that the early introduction of recapture technology is advantageous in that requirements in terms of minimum buffer zones, monitoring, reporting and notification are reduced.

### **What is recapture technology?**

16.11.4 Recapture technology is a term used to describe systems that reduce methyl bromide emissions from fumigation enclosures by:

- (a) capturing methyl bromide on activated carbon or other medium so that it is not released into the atmosphere; or
- (b) destroying the methyl bromide gas from the fumigation before a container is ventilated.
- 16.11.5 As described by submitters involved in developing the technology, recapture is normally done by ventilating air from the enclosure using fans that pull fresh air into the enclosure and “sweep” the air containing methyl bromide into the outlet stream. This methyl bromide laden air stream is then passed over a large carbon bed where the methyl bromide is adsorbed or trapped onto carbon particles.
- 16.11.6 The contaminated carbon can be buried in specific landfill sites or treated with a solution of sodium thiosulphate to produce non-toxic products.
- 16.11.7 The Committee notes that the use of recapture technology would:
- be consistent with the intent of the Montreal Protocol;
  - reduce the risk of direct effects on operators, occupational bystanders and the general public by minimising the likelihood of exposure of people to methyl bromide; and
  - reduce the risk of indirect effects on human health and the environment due to the ozone-depleting properties of methyl bromide.
- 16.11.8 Furthermore, the Committee notes that recapture would allow for the continued use of methyl bromide and enable the following benefits to be retained:
- the prevention of the introduction of human disease vector organisms such as particular species of mosquito which could transmit diseases such as malaria, Ross River virus and dengue;
  - the prevention of the introduction and establishment of an exotic pest/disease which could affect natural ecosystems and the profitability of the agricultural production system; and
  - access to overseas markets, particularly for the export of logs.
- 16.11.9 For these reasons, the Committee has reviewed the feasibility of requiring the recapture of methyl bromide used in fumigation activities.
- 16.11.10 In the reassessment application, the Agency considered the practicality and affordability of recapture technology, with reference to a report prepared by Aurecon New Zealand for STIMBR. This report was attached as **Appendix Q** to the application.
- 16.11.11 The Agency concluded that the high investment and operating costs of a recycling system would be a commercial decision and would need to be balanced against the cost of developing alternatives and gaining international acceptance for exports.
- 16.11.12 The Agency also noted that recovering the residual gases from several thousand tonne log fumigations had yet to be attempted. The mass of activated carbon (probably in the 20 to 80 tonnes range), the size of the containment vessels, and the need to regenerate or dispose of this mass of activated carbon would present logistical problems.

- 16.11.13 Overall, the Agency considered that further research is needed into the logistics and cost structure before recapture could be considered “practical and affordable” and thus be considered as a mandatory requirement in New Zealand.
- 16.11.14 A number of submissions received on the application confirmed that recapture of methyl bromide from shipping container fumigations is technically feasible.
- 16.11.15 Based on the submissions, the Agency concluded that the costs for small-scale fumigations are lower than was estimated in the reassessment application. Because of the reduction in exposure to people and the environment that can be achieved through recapture, the Agency recommended requiring the use of recapture technology for shipping container (20 foot and 40 foot) fumigations.
- 16.11.16 However, as indicated in the update paper, the Agency did not consider that the technology could be made mandatory for large-scale fumigations at this time as the practicality and cost of recapture for such fumigations which account for 80% of the methyl bromide used in New Zealand, is uncertain.
- 16.11.17 Following the hearings and review of the written submissions, the Committee concluded that it is desirable that emissions from methyl bromide fumigations be reduced by the use of recapture technology. Consequently, on behalf of the Committee, the Agency sought more information from submitters and stakeholders on the practicality and affordability of mandating recapture. Details of the information request and the parties contacted are given in **Appendix B**.
- 16.11.18 In particular, the Agency sought advice, on behalf of the Committee, on the impact the following scenario would have:

<b>Recapture of methyl bromide fumigations required:</b>	<b>100%</b>	<b>50%*</b>
Shipping container fumigations	2 years	1 year
Ship hold fumigations	2 years	1 year
Logs under covers	10 years	5 years

\*50% of fumigations refers to half the methyl bromide fumigations carried out by each fumigation company in a 12 month period, not necessarily half the fumigations carried out a particular location.

- 16.11.19 The responses demonstrated the wide variability in what the parties consider recapture would cost at different localities and also the logistical implications requiring recapture would have for different locations.

#### **Shipping container recapture**

- 16.11.20 Submitters indicated that the current costs of fumigation on average are approximately \$200 per 20 ft container, \$300 per 40 ft container, on site at the importers’ premises (transitional facilities). Requiring recapture would generate additional costs including alterations to vehicle fleet required to transport equipment and costs associated with carbon (i.e. purchase, storage and disposal). There will also be increased costs attributable to the increased cost of labour – from one to two persons per treatment and the increased time involved in releasing a container from fumigation – up to one hour for a 20 ft container due to restrictions on the number able to be released in a given area, compared with current practice of 15 minutes per container with multiple container releases at any one time.

- 16.11.21 As very low volumes of methyl bromide are administered to each fumigation (i.e. 1.4 kg to each 20 ft container) the recapturing of methyl bromide across multiple and widespread geographical sites will involve considerable effort and the costs may not be justified in comparison with fumigations at one site where large volumes of methyl bromide are administered (e.g. fumigation of large stacks of logs at a wharf).
- 16.11.22 MAFBNZ indicated that introducing recapture will mean extra time for venting will be needed resulting in a need for more space and extra costs for storage/ berthing.
- 16.11.23 The larger ports, Auckland and Tauranga, also expressed concern about additional time being needed for fumigation/venting. More time means additional costs in terms of space and delays in moving containers through the ports. Quick dispatch of containers from the port to the end user is considered essential with any delay being deemed unacceptable.
- 16.11.24 MAFBNZ and Genera expressed concern that, if the costs of fumigation become too high, pest incursions may not be reported and therefore not treated.

#### **Ship hold fumigation recapture**

- 16.11.25 MAFBNZ reported that there is no equipment currently available to recapture methyl bromide from ship hold fumigations. Development time would be required to design, build and test a suitable unit.
- 16.11.26 The fumigation companies, Rentokil and Genera, also indicated that no acceptable equipment is available to carry out fumigation in ship holds and that manufacturers/suppliers of recapture equipment will need to demonstrate that the equipment is reliable, consistent, efficient and cost-effective.

#### **Under sheets fumigation recapture**

- 16.11.27 MAFBNZ estimated that the additional costs of methyl bromide fumigation of logs under covers would amount to more than \$13 million/year based on estimated additional costs of \$3–\$8 per m<sup>3</sup> fumigated.
- 16.11.28 Port Tauranga expressed concerns about the logistics and practicality of log fumigation with recapture and noted that the procedure has yet to be proven.
- 16.11.29 The fumigation companies, Rentokil and Genera, also indicated that no acceptable equipment is available to carry out fumigation of logs under covers with recapture and that manufacturers/suppliers of recapture equipment will need to demonstrate that the equipment is reliable, consistent, efficient and cost effective.

#### **Disposal of contaminated carbon**

- 16.11.30 Port Nelson indicated that it is expensive to dispose of saturated carbon (app. \$1.50 per kg) and at this stage no local/regional landfill is prepared to receive the carbon due to current landfill requirements.
- 16.11.31 Port Tauranga noted that, in general, disposal of any contaminated product is time consuming and costly and that storage of new and used carbon will be an issue.
- 16.11.32 NZ FPIA noted that Nordiko's recapture system requires single use of carbon to deactivate methyl bromide as it is removed from a container whereas other companies who provide recapture equipment recommend the use of "scrubbing"

agents to scrub the carbon after the methyl bromide has been deactivated. The scrubbing agent is then able to be disposed of in normal effluent disposal systems and the carbon re-used. NZFPIA considers that this additional technology should be investigated further.

### **Timetable**

#### *Shipping containers*

- 16.11.33 MAFBNZ consider that two years is feasible for requiring recapture of shipping container fumigations as the technology is there and any issues relating to disposal of saturated carbon should be resolved in two years time.
- 16.11.34 However, the Port of Tauranga considers that there are important issues to be resolved before a timetable can be considered. The Port indicated that it will support any system which ensures the integrity of our imports and exports, but this cannot compromise the efficient throughput of cargo. With the move towards larger vessels servicing the ports with, consequently, much larger container exchanges, they cannot afford to have “bottlenecks” introduced to the quick dispatch of containers from the Port to the end user.

#### *Ship holds*

- 16.11.35 Genera do not consider a two-year timeframe to be achievable as there is no equipment available at this moment and there is no experience at all with recapture technology on ships’ holds.
- 16.11.36 MAFBNZ consider it unlikely that equipment will be available in one year. Development time would be required to design, build and test a suitable unit. The timetable has to be determined after development of suitable technology and experience with the technique.
- 16.11.37 Rentokil consider one or two years too short but 10 years is achievable.

#### *Logs under sheets*

- 16.11.38 MAFBNZ submitted that there is no recapture technology available at this stage but expects the technology will be available within 10 years.
- 16.11.39 The fumigators, Rentokil and Genera, consider that the suggested timetable is not achievable because of the lack of suitable equipment.
- 16.11.40 Port Nelson confirmed that recapture technology is not available for this type of fumigation and it will take years to obtain the necessary approvals/consents.

### **Transitional arrangements**

- 16.11.41 In their response, MAFBNZ indicated that requiring 50% recapture would increase the costs per container because of the lease costs of the equipment. They also noted that inequalities in the prices may cause difficulties for companies and the provision would be difficult to enforce.
- 16.11.42 Genera confirmed that a transitional period would cause problems commercially because of the different charges and suggested an option could be to do this on a port by port basis.

16.11.43 Rentokil also noted that it would be very hard to explain that some customers have to pay more than others during the transitional period. Rentokil also noted that different timelines for containers and fumigations under covers may result in all fumigations being carried out “under cover” instead of in containers to avoid the recapturing of container fumigation requirements.

#### **Review**

16.11.44 STIMBR, the Wood Processors Association and the New Zealand Pine Manufacturers Association suggested that, because of concerns about the timetable and uncertainties of costs and disposal of carbon, the introduction of recapture technology should be reviewed in 12 months time.

16.11.45 TPT Forests recommended that appropriate independent analysis, assessment and technology development work is undertaken for larger scale fumigations to:

- explore all the available options and recapture technology for large scale fumigations;
- commercially develop the appropriate technology and systems for recapture that are both operationally practical and efficient for large scale fumigations;
- undertake commercial trials to fully understand the operational process and requirements;
- determine the accurate costing of a commercial fumigation and recapture operation; and
- determine the commercial viability of methyl bromide fumigation recapture to ensure log exporting remains internationally competitive and provides an appropriate return to the forest owners.

16.11.46 Rentokil and Genera also recommended that a full independent assessment of the options currently available should be carried out before mandatory capture is required.

16.11.47 Brustics also supported a comprehensive feasibility study and industry-based trial before any change in the current process/ method is made.

#### **Conclusion**

16.11.48 The Committee notes the responses from the submitters and stakeholders and concludes that:

- while the recapture of methyl bromide used in shipping container fumigations is technically proven and is operational in some circumstances, its mandatory introduction in places where large numbers of containers are fumigated will have significant logistical and economic impacts;
- it will be some time before equipment is available to recapture methyl bromide used in ship hold fumigations; and
- the technology for recapture of methyl bromide from fumigations under sheets is still being developed.

16.11.49 Taking these conclusions into account, the Committee remains of the view that the use of recapture technology is a desirable outcome and decides that all methyl bromide used in fumigation activities in New Zealand should be subject to recapture technology within 10 years from the date of this decision.

- 16.11.50 A 10-year timeframe has been chosen to allow for development, acquisition and installation of suitable equipment.
- 16.11.51 The Committee has given consideration to setting out transitional steps which would see recapture technology progressively introduced over the next 10 years but acknowledges that such transitional provisions would be difficult to manage.
- 16.11.52 However, the Committee is requiring fumigators to report to ERMA New Zealand on an annual basis on progress in introducing recapture technology.

## **16.12 Managing the risk of fumigation with methyl bromide at transitional facilities**

- 16.12.1 The Biosecurity Act 1993 prescribes requirements for the exclusion, eradication and effective management of pests and unwanted organisms which have the potential to cause harm to natural and physical resources and human health in New Zealand. Any imported risk goods must receive biosecurity clearance before they can officially enter New Zealand.
- 16.12.2 Uncleared goods include imported goods such as food products, items made from wood or plant material, sea containers, used machinery or vehicles, and other goods defined as risk goods under the Biosecurity Act 1993.
- 16.12.3 If biosecurity risks are identified or suspected in uncleared goods, the goods must be treated, destroyed or re-shipped as directed by a MAF Inspector. Goods directed for treatment must either be securely transported to a transitional facility approved to provide treatments, or treated on site at the importing facility by a MAF approved treatment provider.
- 16.12.4 The *Standard for General Transitional Facilities for Uncleared Goods (BNZ-STD-GEN)* (the Standard) sets out the minimum requirements for the construction, maintenance, operation and approval of transitional facilities and operators of transitional facilities. The facility operator is responsible for ensuring that the requirements of the Standard are met. The facility operator must be a fit and proper person to operate the facility.
- 16.12.5 Transitional facilities may encompass parts of or whole premises, and approvals are limited to the purpose, scope and activities described in the operating manual for each facility. Transitional facility approvals may be for the period of the import only, or may be for an unspecified time or until a specified event.
- 16.12.6 With regard to fumigation at transitional facilities, there are two scenarios where methyl bromide is used:
- (a) to fumigate known risk goods, such as bamboo or scrap metal, which have a high likelihood of harbouring unwanted organisms; and
  - (b) where quarantine pests are detected (post border incursions).
- 16.12.7 The Standard sets out the requirements for the location of a transitional facility, based on the ability of the facility to deal with biosecurity risk material. Transitional facilities must be located in areas that can provide services and systems to ensure that



the biosecurity of uncleared goods is maintained and that adequate provision can be made for the management of contingencies in the event of an incident or containment breach (e.g., access to public sewer and mains power).

- 16.12.8 The approval of facilities outside serviced areas is dependent on the types of goods being imported and the provisions in place to ensure biosecurity can be maintained. Facilities need to meet specific physical and operational requirements outlined in the MAFBNZ facilities standards.
- 16.12.9 MAFBNZ records the names and locations of transitional and port facilities where methyl bromide has been used in fumigation, but there is no information available on the locations with respect to proximity to areas where members of the general public may be present.
- 16.12.10 In the year from 1 July 2008 to 30 June 2009<sup>20</sup>, there were 5,871 transitional facilities that received containers. Of these, 719 had methyl bromide fumigations occur on site; 639 (89%) of the 719 had less than 12 fumigations per year; and 319 (44%) had only one container treated.
- 16.12.11 MAFBNZ supplied information in their submission that a 10 m buffer zone could be accommodated by 98% of the facilities.
- 16.12.12 As outlined in section 16.4, based on the air quality monitoring data that the Agency received during the submission process, requiring a minimum buffer zone should mean that members of the public would be unlikely to be exposed to concentrations in exceedance of the 1-hour TEL. However, because of the difficulty of evacuating people, the Committee considers that methyl bromide should not be applied within 25 m of any sensitive sites such as a school, playground, early childhood centre, prison, hospital or long term care facility.
- 16.12.13 If a person applies methyl bromide at a transitional facility and is unable to meet the minimum buffer zone requirements, they are not permitted to use methyl bromide without recapture technology unless they have an ERMA approved code of practice for complying with the TELs. As discussed above, the recapture requirements could add around \$210 to \$275 to the cost of fumigation per container.
- 16.12.14 In order to demonstrate that they are meeting the TEL value, persons applying methyl bromide will be required to carry out air quality monitoring for all fumigations. Furthermore, the Committee notes that to ensure compliance with both the 24 hour and chronic TEL, persons applying methyl bromide will need to continually review their air quality monitoring.
- 16.12.15 The Committee also notes the concerns presented by NZFPFA that recapturing methyl bromide across multiple and widespread geographical sites will involve considerable effort and the costs may not be justified given the small volume of methyl bromide administered, in comparison with fumigations at one site where large volumes of methyl bromide are administered (e.g. fumigation of large log stacks at a wharf).

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<sup>20</sup> K Glassey Email dated 25 May 2010 with attached list of locations where fumigations took place 2008-2009

- 16.12.16 MAFBNZ has advised that only 2% of transitional facilities will not be able to meet the 10 m minimum buffer zone requirements. Methyl bromide fumigation cannot be undertaken unless recapture technology is used. The Committee is satisfied that the benefits of requiring recapture, where the minimum buffer zone requirements cannot be met, outweigh the costs involved.

### 16.13 Treating potato wart

- 16.13.1 Eradication operations involving soil fumigation treatment with methyl bromide are carried out by commercial fumigation contractors, employed byASURE Quality Ltd. The information supplied to the Agency by MAFBNZ is as follows:

#### ***Treatment***

*Methyl bromide as a gas is used for treatment (chloropicrin indicator is optional). The application rate is 380 grams per square meter (380 g/m<sup>2</sup>) for 24 hours. The contractor must meet all fumigation requirements. This may include them notifying the Ministry of Health, local Police, and local Fire Authority.*

*The contractor covers the site, sealing the cover in a border trench backfilled with material like damp sand, bricks, or timber. Inverted bottles or boxes can be used to keep the cover off the soil to allow better gas spread.*

*The contractor is responsible for the safety of the area during gas treatment.*

*The methyl bromide liquid is heated into gas and released under cover. After initial gas release the contractor will check for gas leakage using flame or vacuum sensors.*

*The cover remains sealed over the areas for at least 24 hours under the responsibility and supervision of the contractor and in accordance with any special requirements of the Ministry of Health Inspectors. An all night watch may be required.*

- 16.13.2 MAFBNZ have advised that the focus of the official control programme for potato wart is to eradicate notified detections of the organism in home gardens. Potato wart incursions in commercial potato production or packhouses would require a large scale special emergency response involving tracing sources, controlling movement and decontamination. Such a response may or may not involve the use of methyl bromide.
- 16.13.3 The Committee considers that the use of methyl bromide for the management and eradication of potato wart incursions in commercial potato production areas or packhouses is outside the scope of this approval. Such use, if contemplated, would require an application for approval to use methyl bromide in a special emergency under section 49D of the Act.

#### **Controls**

- 16.13.4 The controls which apply to the import, transport, use, tracking and disposal of methyl bromide apply (see Table 1 in **Appendix C**). The Committee imposes the following additional controls which are specific to its use as a soil fumigant for the management and eradication of small scale incursions of potato wart (*Synchytrium endobioticum*).

- (a) The substance approved for use as a soil fumigant for the management and eradication of small scale incursions of potato wart (*Synchytrium endobioticum*) is:
- Gas containing 1000g/kg methyl bromide (HSNO approval HSR001635).*
- (b) The use of methyl bromide as a soil fumigant for the management and eradication of small scale incursions of potato wart may only be undertaken by an authorised person<sup>21</sup> or a person working under the direct supervision of an authorised person.
- (c) Written notice will be given to the relevant Medical Officer of Health and the nearest communications centre of the New Zealand Fire Service in writing at least 48 hours prior to applying methyl bromide. In addition, notification will be given to the occupant of every property within 25 m of the fumigation site at least 24 hours prior to the fumigation and to the person in charge of each sensitive site within 100 m of the fumigation site at least 48 hours prior to the fumigation.
- (d) If the fumigation is to take place on a residential property, residents (including pets) of the property shall be evacuated during and until 24 hours after completion of the fumigation. However, residents or other members of the public may return to the property after the removal of the sheet, if the concentration of methyl bromide measured at 30 cm above the treated soil is less than 0.05 ppm for a period of 15 minutes.
- (e) The site to be fumigated must be covered with heavy duty polyethylene sheets which are fully water proof and non-permeable, with joins overlapped and bonded by plastic joining tape. The cover must be sealed in a border trench which will be filled with materials (e.g. sand, water, timber) to provide a good seal around the area to be fumigated.
- (f) The maximum application rate for the substance to be applied to soil is 380 grams per square metre (380g/m<sup>2</sup>) into the sealed and trenched area.
- (g) The cover will remain sealed over the fumigation site area for at least 24 hours after the application of methyl bromide under the responsibility and supervision of the person who applied the methyl bromide. The treatment site will be under the authority of the authorised person and no public or unauthorised access will be permitted onto the site during the treatment period (the treatment period includes the fumigation, the 24 hour holding period and removal of the cover).
- (h) At the end of the 24 hour holding period the operator will check the seal and remove the cover by slowly rolling it off the fumigation area.

16.13.5 The Committee also recommends that:

- neighbouring properties should be visited and assessed for risk and proximity and offered evacuation if appropriate or requested; and

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<sup>21</sup> An authorised person is a person appointed as such under section 103 of the Biosecurity Act for the purposes of administering and enforcing the provisions of the Biosecurity Act or for the purposes of a national pest management strategy

- the operation should be planned such that the timing and conditions for removal of the cover is undertaken where there are fewer people around and low wind speed.

#### **16.14 Declining approvals for methyl bromide/chloropicrin mixtures (soil fumigants)**

- 16.14.1 Since the critical use exemption (CUE) under the Montreal Protocol has expired and these substances are not used in the management and eradication of potato wart, the Committee declines to continue the approvals of the two substances which were approved for use for soil fumigation –
- gas containing 980 g/kg methyl bromide and 20 g/kg chloropicrin (*HSNO Approval HSR001637*); and
  - gas containing 300-670 g/kg methyl bromide and 330-700 g/kg chloropicrin (*HSNO Approval HSR001638*).
- 16.14.2 The Committee issues a direction, by Notice in the *New Zealand Gazette*, prohibiting the further use of the above two substances (including all formulations matching these approvals) containing methyl bromide and chloropicrin from 28 days after the date of the Notice. In addition, the substances are to be disposed of, at the owner's expense, in accordance with the controls placed on them by the Authority, by 1 January 2011.

## **17 Overall evaluation of significant adverse and positive effects**

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### **17.1 Introduction**

- 17.1.1 The overall evaluation of risks, costs and benefits was carried out having regard to clauses 22 and 34 of the Methodology and in accordance with the tests in clause 27 of the Methodology and section 29 of the Act. Risks were evaluated taking account of all proposed controls including default controls plus proposed variations to the previous controls (see Section 16 of this decision).
- 17.1.2 Clause 34 of the Methodology sets out the approaches available to the Authority in evaluating the combined impact of risks costs and benefits, i.e. weighing up risks, costs and benefits.

#### **Precautionary approach**

- 17.1.3 Section 7 of the Act requires the Committee to take into account the need for caution in managing adverse effects where there is scientific and technical uncertainty about those effects. In identifying and assessing the risks, the Committee considered the upper and lower bounds on the assessment of individual risks. The assessment was based on the higher value of the risk, thus incorporating a precautionary approach.
- 17.1.4 Clause 29 of the Methodology notes that where there is scientific and technical uncertainty the Authority must consider the materiality of the uncertainty to the decision. If such uncertainty cannot be resolved, clause 30 requires the Authority to take into account the need for caution in managing the adverse effects of the substances. The Committee acknowledges that there is some uncertainty as to the magnitude and likelihood of some of the adverse effects but this uncertainty has been taken into account by the Committee in assessing the adverse and positive effects and establishing the new management regime.

#### **Approach to risk**

- 17.1.5 Clause 33 provides guidance on how cautious or risk averse the Authority should be in weighing up overall adverse effects (risks and costs) and positive effects (benefits). The factors to be considered are whether:
- exposure to the risk is involuntary;
  - the risk will persist over time;
  - the risk is subject to uncontrollable spread and is likely to extend its effects beyond the immediate location of incidence;
  - the potential adverse effects are irreversible; and/or
  - the risk is not known or understood by the general public and there is little experience or understanding of possible measures for managing the potential adverse effects.

17.1.6 The Committee has addressed these factors for each of the individual risks assessed as being potentially significant. The Committee does not consider that any additional caution over and above the conservative approach adopted in the Agency's application is required.

**Likely effects of unavailability of methyl bromide**

17.1.7 Section 29 of the Act requires the Committee to take into account the likely effects of the substance being unavailable. As noted in Section 15 above, if methyl bromide was not available then the benefits that have been assessed would not be realised. The Committee has incorporated the likely effects of the substance being unavailable into its assessment of adverse and positive effects.

**Aggregation and comparison of risks, costs and benefits**

17.1.8 A summary of the effects, the magnitude of those effects should they occur, the likelihood of the effects being realised and their associated level of adverse or beneficial effect (risk, cost or benefit) as determined by the Committee, is provided in Tables 17.1 and 17.2 below.

17.1.9 An explanation of the magnitude and likelihood and level of risk descriptors can be found in **Appendix D**.

17.1.10 As the Committee considers methyl bromide to pose negligible risks to the environment and human health, clause 26 of the Methodology applies. Under clause 26, the Committee may approve the import and use of the methyl bromide if it is evident that the benefits associated with it outweigh the costs.

17.1.11 In the following sections, the Committee sets out its overall evaluation of the risks, costs and benefits in the following areas;

- human health;
- the environment;
- the relationship of Māori to the environment;
- society and communities; and
- the market economy.

**Table 17.1: A summary of the Committee’s assessment of the level of risk from the use of methyl bromide**

Area of impact	Key controls	Magnitude	Likelihood	Level of risk
Fumigation staff	<ul style="list-style-type: none"> <li>Approved handlers</li> <li>Licensing</li> <li>Personal protective equipment</li> </ul>	Moderate	Highly improbable	Negligible
Occupational bystanders	<ul style="list-style-type: none"> <li>Worker exposure standard</li> </ul>	Minor	Very unlikely	Negligible
Workers opening containers	<ul style="list-style-type: none"> <li>Personal protective equipment</li> <li>Signage</li> <li>Approved handlers</li> <li>Licensing</li> </ul>	Minor	Very unlikely	Negligible
General public	<ul style="list-style-type: none"> <li>TELs</li> <li>Buffer zones</li> <li>Notification</li> <li>Approved handlers</li> <li>Licensing</li> </ul>	Minor	Highly improbable	Negligible
The environment	Due to a lack of direct exposure, significant ecotoxicological effects to plants, terrestrial or aquatic organisms are not expected			
Kaitiakitanga	<ul style="list-style-type: none"> <li>Approved handlers</li> <li>Licensing</li> <li>Buffer zones</li> </ul>	Minor	Very unlikely	Negligible
Manaakitanga	<ul style="list-style-type: none"> <li>TELs</li> <li>Buffer zones</li> <li>Notification</li> <li>Approved handlers</li> <li>Licensing</li> </ul>	Moderate	Highly improbable	Negligible
Society and communities – concern about health effects	<ul style="list-style-type: none"> <li>Monitoring and reporting on fumigation activities</li> <li>Buffer zones</li> <li>Public notification of large-scale fumigation activities.</li> </ul>	Minor	Very unlikely	Negligible
The market economy – additional costs associated with adverse public reaction	<ul style="list-style-type: none"> <li>Monitoring and reporting on fumigation activities</li> </ul>	Minor	Very unlikely	Negligible

**Table 17.2: A summary of the Committee’s assessment of the level of benefit from the use of methyl bromide**

Area of impact	Potential positive effects	Magnitude	Likelihood	Level of benefit
Human health	Prevention of the introduction of human disease vector organisms (such as particular species of mosquito) and venomous spiders.	Major	Likely	Medium
Environment	Prevention of the establishment of an exotic pest/disease that has effects on the productive capability of the agricultural production system and natural ecosystem.	Major	Likely	Medium
Iwi/Māori	The protection of native and valued species.	Moderate	Likely	Medium
	Maintenance of Māori interests in forestry assets	Moderate	Likely	Medium
Society and communities	No potentially significant benefits were identified			
Market economy	Prevention of unwanted organisms and market access for forestry and horticultural products	Major	Highly likely	High

## 17.2 Overall evaluation: human health and safety

- 17.2.1 The Committee considers that significant benefits for human health and safety arise from the use of methyl bromide in the quarantine treatment of incoming goods to prevent the introduction of human disease vector organisms and venomous spiders. If such organisms (such as particular species of mosquito) were introduced, very significant human health impacts could occur due to the transmission of diseases such as malaria, Ross River virus and dengue.
- 17.2.2 As indicated in Section 13.4, the Committee considers that protection from introduced disease vectors and venomous spiders presents a *medium* level of benefit to human health.
- 17.2.3 As indicated in Section 12.4, the Committee is satisfied that the level of risk to human health is *negligible* taking into account, the revised management regime which includes:
- short term exposure limits (TELs) for methyl bromide;
  - minimum buffer zones; and
  - notification for large scale fumigations.
- 17.2.4 As the risks to human health are *negligible* with the controls in place, and a *medium* level of benefit has been identified, the Committee is satisfied that the benefits to human health outweigh the risks and costs.



### 17.3 Overall evaluation: the environment

- 17.3.1 As indicated in Section 13.5, the Committee considers that there is a *medium* benefit associated with the use of methyl bromide in protecting the agricultural production system and the natural ecosystem from the potential introduction of damaging pests.
- 17.3.2 The Committee considers that there are no significant direct risks to the environment associated with the use of methyl bromide as a fumigant for QPS purposes.
- 17.3.3 Overall the Committee concludes that, taking into account the controls, the environmental benefits of the use of methyl bromide outweigh the adverse effects.

### 17.4 Overall evaluation: relationship of Māori to the environment

- 17.4.1 On reviewing the submissions received with specific relevance to the relationship of Māori to the environment, the Committee has taken into account the varying locations methyl bromide is used hence the varying levels of impact, effect and likelihood.
- 17.4.2 As mentioned earlier, the submission from Whareroa Marae, which is located adjacent to the port in Tauranga, expressed a number of concerns, for example, the Marae has closed in the past due to fumigation taking place hence there is more of an impact/effect than say the Napier Port which has no marae or areas of Māori significance within close proximity that the Committee is aware of.
- 17.4.3 In addition, the closure of marae and areas of Māori significance, such as seafood gathering areas in which, the ability to provide both Kaitiakitanga and Manaakitanga will be variable from location to location (Tauranga being a high impact location and Wellington/Napier being reduced impact locations). This variance has determined the range of impacts and effects measurements.
- 17.4.4 Regarding the positive opportunities methyl bromide enables in relation to border control and its effectiveness particularly in high import volume areas such as Auckland can be viewed as enhancing Kaitiakitanga.
- 17.4.5 Furthermore, employment opportunities for Māori in the forestry sector are significant. Port Tauranga is the largest employer of Māori in the Bay of Plenty region. Thus, the Committee considers that a *moderate* positive effect on the relationship of iwi/Māori to the environment and in their ongoing ability to develop economically is *likely* to occur from the continued availability of methyl bromide. The corresponding level of benefit is therefore assessed to be *medium*.
- 17.4.6 It is the Committee's view that a *minor* effect on Kaitiakitanga would be *very unlikely* to occur. Thus the level of risk upon Kaitiakitanga is assessed as *negligible*.
- 17.4.7 As indicated earlier, the Committee is requiring that fumigators notify neighbouring properties in Tauranga, including Ngāti Kuku Hapū Environmental Unit and the community of Whareroa Marae, of intended fumigation activities. The Committee asks that the Agency satisfies itself that appropriate arrangements for notification are in place and that these are reported on in the Annual Monitoring Report prepared in relation to Port Tauranga.
- 17.4.8 A *moderate* impact upon Manaakitanga, is *highly improbable* to occur if an appropriate

notification agreement were reached for Port Tauranga and local iwi. Thus the level of risk to Manaakitanga is assessed as *negligible*.

- 17.4.9 The Committee is satisfied that, with the controls in place, and the specific notification requirement for Port Tauranga, the *medium* level of benefit to relationship of Māori and the environment outweighs the impacts on Kaitiakitanga and Manaakitanga.

## 17.5 Overall evaluation: society and communities

- 17.5.1 The Committee did not identify any potentially significant positive effects on society and communities over and above the level of employment, and reduction of pests in agriculture. While there may be social effects from the reduction of introduced pests which might have positive effects on society and community, the Committee was not able to assess the nature or size of such benefits.
- 17.5.2 As discussed in Section 12.6 above, the Committee acknowledges that there are significant concerns about the potential adverse effects on members of the public from the use of methyl bromide.
- 17.5.3 In this regard, the Committee considers that the following requirements will mitigate community concerns so that the level of risk is *negligible*. These requirements are the:
- monitoring and reporting on fumigation activities;
  - setting of minimum buffer zones between the fumigation site and members of the public; and
  - public notification of large-scale fumigation activities.
- 17.5.4 Overall, the Committee considers that, with the revised controls in place, the benefits to society and communities outweigh the risk and costs.

## 17.6 Overall evaluation: market economy

- 17.6.1 The adverse effects on the market economy associated with the continued use of methyl bromide resulting from changes to port practices as a result of public concern have been assessed as being *negligible* with the revised management regime in place.
- 17.6.2 As discussed above, the Committee has addressed the effects on the community by the introduction of revised controls, including TELs, monitoring, reporting, minimum buffer zones and recapture.
- 17.6.3 However, the introduction of these controls will itself have an economic impact. For instance the cost of fumigating a shipping container with recapture will increase by \$210 to \$275 per container. The logistical costs for ports are also significant in terms of space required and in terms of time delays.
- 17.6.4 Nevertheless, there are significant benefits from the continuance of trade. Taking trade in logs alone, a *major* positive effect is *highly likely* to occur. Thus the level of benefit or positive effect is *high*.
- 17.6.5 Overall, the Committee is satisfied that, with the revised controls in place, the benefits to the market economy outweigh the risk and costs.

## 18 Environmental user charges

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- 18.1.1 The Committee considers that the application of controls to methyl bromide will provide an effective means of managing the risks associated with the substance throughout its lifecycle. However, the Committee considers it desirable that New Zealand reduces both the amount of methyl bromide used and the amount discharged into the atmosphere.
- 18.1.2 The Committee notes that the reduction in the use of methyl bromide and in atmospheric emissions depends on:
- the availability of alternative fumigants;
  - the availability of alternative methods of treatment of commodities;
  - the availability of practical and affordable methyl bromide recapture technology;
  - the modification of requirements of New Zealand's trading partners; and
  - the adoption of improved integrated pest management strategies.
- 18.1.3 The Committee notes that research is being carried out in these areas and particularly acknowledges the work that STIMBR is promoting funded by a voluntary levy on the amount of methyl bromide being used.
- 18.1.4 The Committee seeks to encourage further research into mechanisms for reducing use of methyl bromide and atmospheric emissions of the substance. In this regard, the Committee notes the proposal by Genera Ltd and Rentokil Pest Control that a levy should be placed on all methyl bromide used. All funds collected from this levy would be directed to an independent assessment of available recapture technology and other alternative treatment options.
- 18.1.5 The Committee considers that a charge on the use of methyl bromide could be a useful way of ensuring ongoing funding. Accordingly, the Committee is requesting that the Agency investigate the feasibility of such a scheme and report back to the Authority for further discussion within 12 months.

## 19 Decision

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19.1.1 Pursuant to sections 63 and 29, the Committee has considered this application to reassess methyl bromide and formulated substances containing methyl bromide.

### The Committee determines that:

19.1.2 Methyl bromide has the following hazard classifications:

Hazardous property	HSNO classification
Flammable gas	2.1.1B
Acute toxicity (oral)	6.1C
Acute toxicity (inhalation)	6.1B
Skin corrosivity	8.2C
Eye corrosivity	8.3A
Mutagenicity	6.6B
Reproductive/ developmental toxicity	6.8B
Target organ systemic toxicity	6.9A
Aquatic ecotoxicity	9.1A
Soil ecotoxicity	9.2A
Terrestrial vertebrate ecotoxicity	9.3B
Terrestrial invertebrate ecotoxicity	9.4A

19.1.3 Based on consideration and analysis of the information provided on the possible effects of methyl bromide, in accordance with the Act and the Methodology, and taking into account the application of current controls (as varied) and the additional controls, the Committee is satisfied, for the reasons set out in this decision, that the positive effects (benefits) of the substance outweigh the adverse effects (risks and costs) associated with the import and use of the substance.

19.1.4 The application for importation of methyl bromide is thus approved, with the controls listed in **Appendix C**.

19.1.5 The Committee issues a direction, by Notice in the *New Zealand Gazette*, prohibiting the further use of:

- gas containing 980 g/kg methyl bromide and 20 g/kg chloropicrin (*HSNO Approval HSR001637*); and
- gas containing 300-670 g/kg methyl bromide and 330–700 g/kg chloropicrin (*HSNO Approval HSR001638*).

19.1.6 This direction mentioned in Section 19.1.5 is to take effect from 28 days after the date of the Notice in the *New Zealand Gazette*.

19.1.7 The Committee requires a substance listed in Section 19.1.5 to be disposed of, at the owner's expense by 1 January 2011 in accordance with the controls that applied to that substance immediately prior to this approval taking effect.

19.1.8 In accordance with clause 36(2)(b), the Committee records that, in reaching its decision, it has applied the balancing tests required under section 29 and clause 26 and has relied in particular on the following criteria in the Act and the Methodology:

- clause 8 – information to be relevant and appropriate;
- clause 9 – equivalent of sections 5, 6 and 8;
- clause 11 – characteristics of substance;
- clause 12 – evaluation of assessment of risks;
- clause 13 – evaluation of assessment of costs and benefits;
- clause 14 – costs and benefits accruing to New Zealand;
- clause 15 – regard to evidence in submissions;
- clause 16 – take account of scientific basis for scientific evidence or uncertainty;
- clause 21 – the decision accords with the requirements of the Act and regulations;
- clause 22 – the evaluation of risks, costs and benefits – relevant considerations;
- clause 24 – the use of recognised risk identification, assessment, evaluation and management techniques;
- clause 25 – the evaluation of risks and taking account of degree of uncertainty;
- clause 26 – evident that risks and costs are outweighed by benefits;
- clause 29 – determine the materiality and significance of any uncertainty;
- clause 30 – take account of the need for caution where uncertainty is not resolved;
- clause 32 – establish range of uncertainty;
- clause 33 – the extent to which ‘risk characteristics’ exist;
- clause 34 – the aggregation and comparison of risks, costs and benefits; and
- clause 35 – the costs and benefits of varying the default controls and inviting the applicants to comment on cost-effective application of controls.



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Helen Atkins  
Chair

Date 29 October 2010

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## Amendment June 2011

Page 94 of the original decision (clause 12) read as follows:

### **12 Signage**

*(1) A person who applies **methyl bromide** must ensure that signs are displayed at every point of access to the **buffer zone**.*

*(1) The signs required by clause 12(1) must:*

- (a) state that fumigation is being carried out; and*
- (b) state that **methyl bromide** is being used; and*
- (c) state that **methyl bromide** is toxic to humans; and*
- (d) describe the general type of hazard associated with **methyl bromide**; and*
- (e) describe the precautions necessary to prevent unintended ignition of methyl **bromide**; and*
- (f) comply with regulation 34(1), (2), and (4), and regulation 35(1), (3), and (5) of the Hazardous Substances (Identification) Regulations 2001, but as if the distances referred to in regulation 35(3) were a distance of not less than 10 metres; and*
- (g) identify the **person in charge** of the **site** and the person **using methyl bromide** and provide sufficient information to enable the persons to be contacted during normal business hours; and*
- (h) state the date on which the **fumigation** commenced; and*
- (i) be illuminated during the hours of darkness; and*
- (j) be able to be readily seen by a person approaching the **buffer zone**, including, when applicable, persons approaching from a seaward direction.*

*(3) The signs required by clause 12(1) must be removed at the end of the **buffer zone period**.*

This was amended under section 67A of the HSNO Act so that page 94 of the decision (clause 12) now reads:

### **12 Fumigation warning**

*(1) A person who applies **methyl bromide** must ensure that persons approaching the **buffer zone** are warned that a **methyl bromide fumigation** is taking place.*

*(1A) For those parts of a **buffer zone** that extend over land, the warning required by clause 12(1) must be provided by displaying a sign that complies with clause 12(2) at every point of access to the **buffer zone**.*

*(1B) For those parts of a **buffer zone** that extend over water, the warning required by clause 12(1) must be able to be readily seen by a person approaching the **buffer zone** from a seaward direction including during the hours of darkness.*

*(2) The signs must:*

- (a) *state that fumigation is being carried out; and*
- (b) *state that methyl bromide is being used; and*
- (c) *state that methyl bromide is toxic to humans; and*
- (d) *describe the general type of hazard associated with methyl bromide; and*
- (e) *describe the precautions necessary to prevent unintended ignition of methyl bromide; and*
- (f) *comply with regulation 34(1), (2), and (4), and regulation 35(1), (3), and (5) of the Hazardous Substances (Identification) Regulations 2001, but as if the distances referred to in regulation 35(3) were a distance of not less than 10 metres; and*
- (g) *identify the person in charge of the site and the person using methyl bromide and provide sufficient information to enable the persons to be contacted during normal business hours; and*
- (h) *state the date on which the fumigation commenced; and*
- (i) *be illuminated during the hours of darkness; and*
- (j) *be able to be readily seen by a person approaching the buffer zone*

(3) A person who applies **methyl bromide** must ensure that physical warnings that are used to comply with clause 12(1) are removed at the end of the **buffer zone period**.



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Helen Atkins  
Chair

Date 17 June 2011

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## Appendix A: Decision path

### Context

This decision path describes the decision-making process for reassessments under section 63 of the Act. These reassessments are deemed to be applications determined under section 29 of the Act.

### Introduction

The purpose of the decision path is to provide the Authority with guidance so that **all relevant matters** in the Act and the Methodology have been addressed. It does not attempt to direct the weighting that the Authority may decide to make on individual aspects of an application.

In this document 'section' refers to sections of the Act, and 'clause' refers to clauses of the HSNO (Methodology) Order 1998 "(the Methodology)".

The decision path has two parts –

**Flowchart** (a logic diagram showing the process prescribed in the Methodology and the Act to be followed in making a decision), and

**Explanatory notes** (discussion of each step of the process).

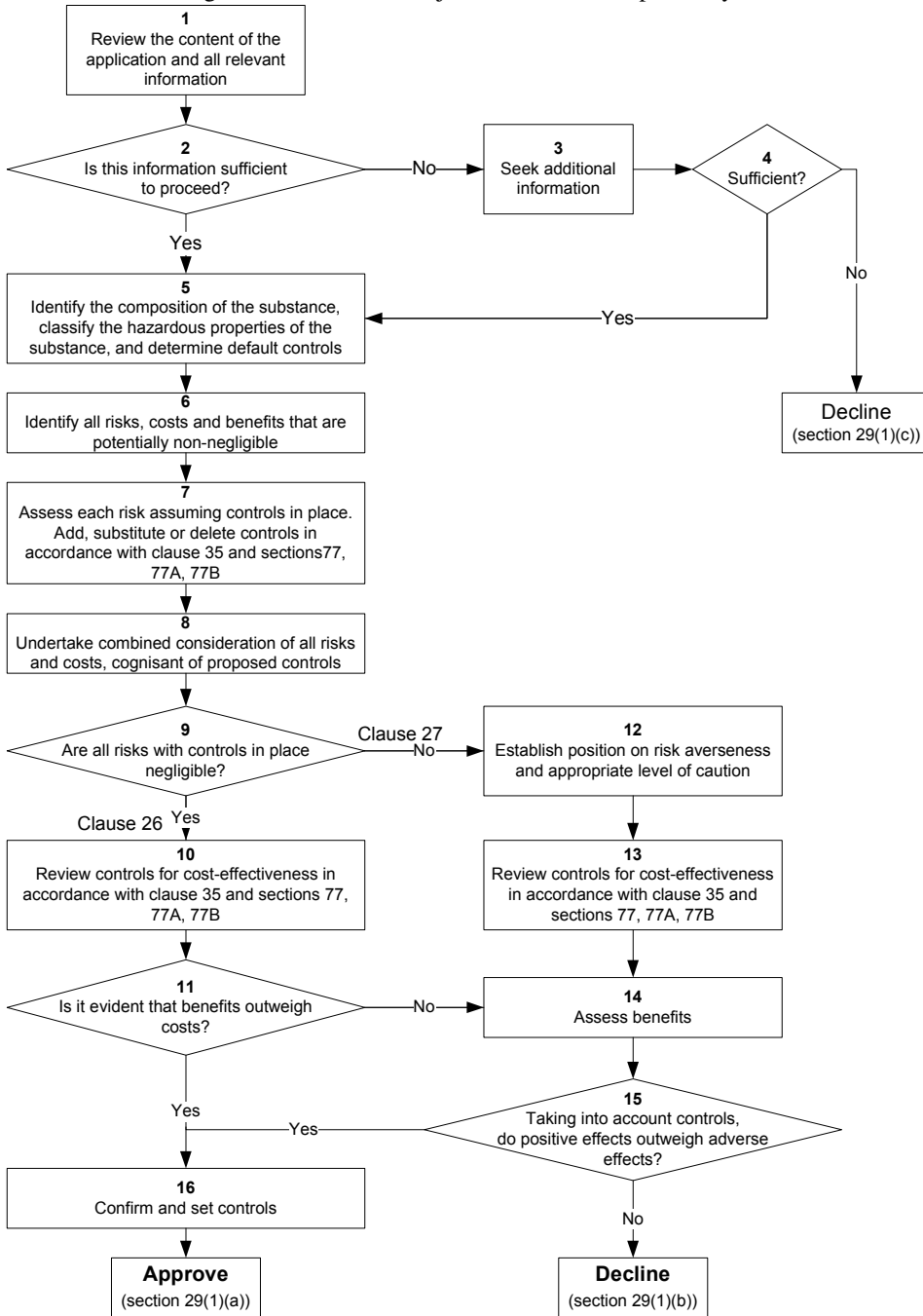
Of necessity the words in the boxes in the flowchart are brief, and key words are used to summarise the activity required. The explanatory notes provide a more comprehensive description of each of the numbered items in the flowchart, and describe the processes that should be followed to achieve the described outcome.

**For proper interpretation of the decision path it is important to work through the flowchart in conjunction with the explanatory notes.**



**Figure A1: Flowchart for methyl bromide decision**

Decision path for applications to reassess a hazardous substance, application made under section 63 of the Act and determined under section 29. For proper interpretation of the decision path it is important to work through the flowchart in conjunction with the explanatory notes.



## Figure A1: Explanatory notes

**Item 1: Review the content of the application and all relevant information**

Review the application, the update paper, and information received from experts and that provided in submissions (where relevant) in terms of section 28(2) of the Act and clauses 8, 15, 16 and 20 of the Methodology.

**Item 2: Is this information sufficient to proceed?**

Review the information and determine whether or not there is sufficient information available to make a decision.

The Methodology (clause 8) states that the information used by the Authority in evaluating applications shall be that which is appropriate and relevant to the application. While the Authority will consider all relevant information, its principal interest is in information which is significant to the proper consideration of the application; ie information which is “necessary and sufficient” for decision-making.

**Item 3: (if no) Seek additional information**

If there is not sufficient information then additional information may need to be sought from the applicant, the Agency or other parties/experts under section 58 of the Act (clause 23 of the Methodology).

**Item 4 Sufficient?**

When additional information has been sought, has this been provided, and is there now sufficient information available to make a decision?

If the Authority is not satisfied that it has sufficient information for consideration, then the application must be declined under section 29(1)(c).

**Item 5: (If ‘yes’ from item 2 or from item 4) Identify the composition of the substance, classify the hazardous properties, and determine default controls**

Identify the composition of the substance, and establish the hazard classifications for the identified substance.

Determine the default controls for the specified hazardous properties using the regulations “toolbox”.

**Item 6: Identify all risks, costs and benefits that are potentially non-negligible<sup>22</sup>**

Costs and benefits are defined in the Methodology as the value of particular effects (clause 2). However, in most cases these ‘values’ are not certain and have a likelihood attached to them. Thus costs and risks are generally linked and may be

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<sup>22</sup> Relevant effects are **marginal effects**, or the changes that will occur as a result of the substance being available. Financial costs associated with preparing and submitting an application are not marginal effects and are not effects of the substance(s) and are therefore not taken into account in weighing up adverse and positive effects. These latter types of costs are sometimes called ‘sunk’ costs since they are incurred whether or not the application is successful.

addressed together. If not, they will be addressed separately. Examples of costs that might not be obviously linked to risks are direct financial costs that cannot be considered as “sunk” costs (see footnote 1). Where such costs arise and they have a market economic effect they will be assessed in the same way as risks, but their likelihood of occurrence will be more certain (see also item 11).

Identification is a two step process that scopes the range of possible effects (risks, costs and benefits).

Step 1: Identify all possible risks and costs (adverse effects) and benefits (positive effects) associated with the approval of the substance(s), and based on the range of areas of impact described in clause 9 of the Methodology and sections 5 and 6 of the Act.<sup>23</sup> Consider the effects of the substance through its lifecycle (clause 11) and include the likely effects of the substance being unavailable (sections 29(1)(a)(iii) and 29(1)(b)(iii)).

Relevant costs and benefits are those that relate to New Zealand and those that would arise as a consequence of approving the application (clause 14).

Consider short-term and long-term effects.

Identify situations where risks and costs occur in one area of impact or affect one sector and benefits accrue to another area or sector; that is, situations where risks and costs do not have corresponding benefits.

Step 2: Document those risks, costs and benefits that can be readily concluded to be negligible<sup>24</sup>, and eliminate them from further consideration.

Note that where there are costs that are not associated with risks some of them may be eliminated at this scoping stage on the basis that the financial cost represented is very small and there is no overall effect on the market economy.

**Item 7: Assess each risk assuming controls in place. Add, substitute or delete controls in accordance with clause 35 and sections 77, 77A and 77B of the Act.**

The assessment of potentially non-negligible risks and costs should be carried out in accordance with clauses 12, 13, 15, 22, 24, 25, and 29 to 32 of the Methodology. The assessment is carried out with the default controls in place.

Assess each potentially non-negligible risk and cost estimating the magnitude of the effect if it should occur and the likelihood of it occurring. Where there are non-negligible financial costs that are not associated with risks then the probability of occurrence (likelihood) may be close to 1. Relevant information provided in

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<sup>23</sup> Effects on the natural environment, effects on human health and safety, effects on Māori culture and traditions, effects on society and community, effects on the market economy.

<sup>24</sup> Negligible effects are defined in the Annotated Methodology as “Risks which are of such little significance in terms of their likelihood and effect that they do not require active management and/or after the application of risk management can be justified by very small levels of benefits”.

submissions should be taken into account.

The distribution of risks and costs should be considered, including geographical distribution and distribution over groups in the community, as well as distribution over time. This information should be retained with the assessed level of risk/cost.

This assessment includes consideration of how cautious the Authority will be in the face of uncertainty (section 7). Where there is uncertainty, it may be necessary to estimate scenarios for lower and upper bounds for the adverse effect as a means of identifying the range of uncertainty (clause 32). It is also important to bear in mind the materiality of the uncertainty and how significant the uncertainty is for the decision (clause 29(a)).

Consider the Authority's approach to risk (clause 33 of the Methodology) or how risk averse the Authority should be in giving weight to the residual risk, where residual risk is the risk remaining after the imposition of controls.

See ERMA New Zealand report 'Approach to Risk' for further guidance<sup>25</sup>.

Where it is clear that residual risks are non-negligible and where appropriate controls are available, add substitute or delete controls in accordance with sections 77 and 77A of the Act to reduce the residual risk to a tolerable level. If the substance has toxic or ecotoxic properties, consider setting exposure limits under section 77B. While clause 35 is relevant here, in terms of considering the costs and benefits of changing the controls, it has more prominence in items 10 and 13

If changes are made to the controls at this stage then the approach to uncertainty and the approach to risk must be revisited.

**Item 8: Undertake combined consideration of all risks and costs, cognisant of proposed controls**

Once the risks and costs have been assessed individually, if appropriate consider all risks and costs together as a "basket" of risks/costs. This may involve combining groups of risks and costs as indicated in clause 34(a) of the Methodology where this is feasible and appropriate, or using other techniques as indicated in clause 34(b). The purpose of this step is to consider the interactions between different effects and determine whether these may change the level of individual risks.

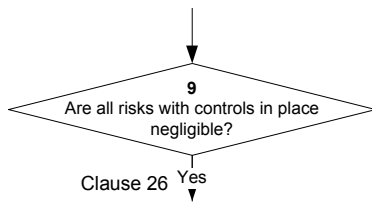
**Item 9: Are all risks with controls in place negligible?**

Looking at individual risks in the context of the "basket" of risks, consider whether all of the residual risks are negligible.

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<sup>25</sup> [www.ermanz.govt.nz/resources/publications/pdfs/ER-OP-03-02.pdf](http://www.ermanz.govt.nz/resources/publications/pdfs/ER-OP-03-02.pdf)

Item  
10:



**(from item 9 - if 'yes') Review controls for cost-effectiveness in accordance with clause 35 and sections 77, 77A and 77B**

Where all risks are negligible the decision must be made under clause 26 of the Methodology.

Consider the practicality and cost-effectiveness of the proposed individual controls and exposure limits (clause 35). Where relevant and appropriate, add, substitute or delete controls whilst taking into account the view of the applicant, and the cost-effectiveness of the full package of controls.

Item  
11:

**Is it evident that benefits outweigh costs?**

Risks have already been determined to be negligible (item 9). In the unusual circumstance where there are non-negligible costs that are not associated with risks they have been assessed in item 7.

Costs are made up of two components: internal costs or those that accrue to the applicant, and external costs or those that accrue to the wider community.

Consider whether there are any non-negligible external costs that are not associated with risks.

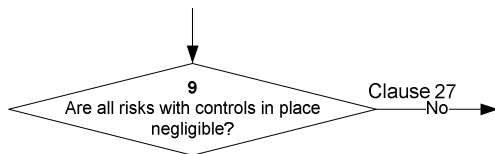
If there are no external non-negligible costs then external benefits outweigh external costs. The fact that the application has been submitted is deemed to demonstrate existence of internal or private net benefit, and therefore total benefits outweigh total costs<sup>26</sup>. As indicated above, where risks are deemed to be negligible, and the only identifiable costs resulting from approving an application are shown to accrue to the applicant, then a cost-benefit analysis will not be required. The act of an application being lodged will be deemed by the Authority to indicate that the applicant believes the benefits to be greater than the costs.

However, if this is not the case and there are external non-negligible costs then all benefits need to be assessed (via item 14).

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<sup>26</sup> Technical guide "Risks, Costs and Benefits" page 6 - note that, where risks are negligible and the costs accrue only to the applicant, no explicit cost benefit analysis is required. In effect, the Authority takes the act of making an application as evidence that the benefits outweigh the costs". See also protocol series 1 "General Requirements for the Identification and Assessment of Risks, Costs, and Benefits".

Item  
12:



**(from item 9 - if ‘no’) Establish Authority’s position on risk averseness and appropriate level of caution**

Although ‘risk averseness’ (approach to risk, clause 33) is considered as a part of the assessment of individual risks, it is good practice to consolidate the view on this if several risks are non-negligible. This consolidation also applies to the consideration of the approach to uncertainty (section 7)

Item  
13: **Review controls for cost-effectiveness in accordance with clause 35 and sections 77, 77A and 77B**

This constitutes a decision made under clause 27 of the Methodology (taken in sequence from items 9 and 12).

Consider whether any of the non-negligible risks can be reduced by varying the controls in accordance with sections 77 and 77A of the Act, or whether there are available more cost-effective controls that achieve the same level of effectiveness (section 77A(4)(b) and clause 35(a)).

Where relevant and appropriate, add, substitute or delete controls whilst taking into account the views of the applicant (clause 35(b)), and making sure that the total benefits that result from doing so continue to outweigh the total risks and costs that result.

As for item 7, if the substance has toxic or ecotoxic properties, consider exposure limits under section 77B.

Item  
14: **(if ‘no’ from item 11 or in sequence from item 13) Assess benefits**

Assess benefits or positive effects in terms of clause 13 of the Methodology.

Since benefits are not certain, they are assessed in the same way as risks. Thus the assessment involves estimating the magnitude of the effect if it should occur and the likelihood of it occurring. This assessment also includes consideration of the Authority’s approach to uncertainty or how cautious the Authority will be in the face of uncertainty (section 7). Where there is uncertainty, it may be necessary to estimate scenarios for lower and upper bounds for the positive effect.

An understanding of the distributional implications of a proposal is an important part of any consideration of costs and benefits, and the distribution of benefits should be considered in the same way as for the distribution of risks and costs.

The Authority will in particular look to identify those situations where the beneficiaries of an application are different from those who bear the costs<sup>27</sup>. This is important not only for reasons related to fairness but also in forming a view of just how robust any claim of an overall net benefit might be. It is much more

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<sup>27</sup> This principle derives from Protocol Series 1, and is restated in the technical guide “Risks, Costs and Benefits”.

difficult to sustain a claim of an overall net benefit if those who enjoy the benefits are different to those who will bear the costs. Thus where benefits accrue to one area or sector and risks and costs are borne by another area or sector then the Authority may choose to be more risk averse and to place a higher weight on the risks and costs.

As for risks and costs, the assessment is carried out with the default controls in place.

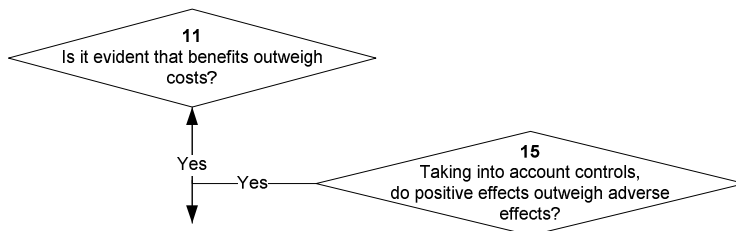
**Item 15: Taking into account controls, do positive effects outweigh adverse effects?**

In weighing up positive and adverse effects, consider clause 34 of the Methodology. Where possible combine groups of risks, costs and benefits or use other techniques such as dominant risks and ranking of risks. The weighing up process takes into account controls proposed in items 5, 7, 10 and/or 13.

Where this item is taken in sequence from items 12, 13 and 14 (i.e. risks are not negligible) it constitutes a decision made under clause 27 of the Methodology.

Where this item is taken in sequence from items 9, 10, 11 and 14 (i.e. risks are negligible, and there are external non-negligible costs) it constitutes a decision made under clause 26 of the Methodology.

**Item 16:**



**(if 'yes' from items 11 or 15) Confirm and set controls**

Controls have been considered at the earlier stages of the process (items 5, 7, 10 and/or 13). The final step in the decision-making process brings together all the proposed controls, and reviews them for overlaps, gaps and inconsistencies. Once these have been resolved the controls are confirmed.

## Appendix B: Further information requests

Subsequent to the hearings, the Committee requested further information (see Table A.1), in accordance with section 58(1), from various ports, industry and fumigation companies (as listed in Table B.1) and MAFBNZ on the impacts of requiring the use of recapture technology. The Committee also requested further information from MAFBNZ on the operation of transitional facilities and the use of methyl bromide to control potato wart, a disease caused by a soil fungus which is a notifiable organism under the Biosecurity Act.

**Table B.1: Further information request on recapture**

With a goal of having all methyl bromide fumigations subject to recapture in 10 years, the Authority would like advice on the impact the following scenario would have:

<b>Recapture of methyl bromide fumigations required:</b>	<b>100 %</b>	<b>50 %*</b>
Shipping container fumigations	2 years	1 year
Ship hold fumigations	2 years	1 year
Logs under covers	10 years	5 years

\*50% of fumigations refers to half the methyl bromide fumigations carried out by each fumigation company in a 12 month period, not necessarily half the fumigations carried out a particular location.

Thus the Committee would like information on:

### ***Shipping container fumigation***

1. How many containers that require fumigation with methyl bromide are handled?
2. The impact of requiring all shipping container fumigations to be recaptured in 2 years.
3. The impact of requiring half of shipping container fumigations to be recaptured in 1 year.
4. If this timetable is not considered practical, what would be a more feasible timetable?

### ***Ship hold fumigation***

5. How many ship holds are fumigated with methyl bromide.
6. The impact of requiring all ship hold fumigations to be recaptured in 2 years
7. The impact of requiring half of ship hold fumigations to be recaptured in 1 year.
8. If this timetable is not considered practical, what would be a more feasible timetable?

### ***Fumigating logs under covers***

9. How much fumigation of logs with methyl bromide under covers is carried out?
10. The impact of requiring recapture of methyl bromide for logs under covers in 10 years.
11. The impact of requiring recapture of half of log fumigations under covers in 5 years.
12. If this timetable is not considered practical, what would be a more feasible timetable?

### ***Disposal of carbon with adsorbed methyl bromide***

13. Do you have any comments to make on the disposal of the large amounts of carbon adsorbed with methyl bromide that will be generated by the introduction of recapture technology?



***Other comments on the introduction of recapture technology***

The **impacts** may include (but need not be limited to) such matters as:

1. Additional costs of installing recapture technology – how long it would take to regain costs.
2. Increased costs of fumigations due to recapture.
3. Predicted increase cost to users.
4. Predicted reduction in profit margins.
5. Costs of disposing of the carbon.
6. Whether more space will be required.
7. Whether more workers will be required.

**Table B.2: Parties that were sent an information request on recapture**

Centreport Limited	Northport Ltd
Port Nelson Limited	Port of Napier Limited
Port of Tauranga Ltd	Port Otago Limited
Ports of Auckland Ltd	South Port New Zealand Ltd
Lyttleton Port of Christchurch	Port Marlborough NZ Ltd
Carter Holt Harvey Limited	New Zealand Forest Owners Association
New Zealand Fresh Produce Importers Association Inc	New Zealand Pine Manufacturers Association
Wood Processors Association of New Zealand	Rayonier New Zealand Ltd
Red Stag Timber Ltd	Scion Research
Zindia Ltd	Brustics Limited
C3 Limited	Horticulture New Zealand
Marlborough Forest Industry Association	Motueka Lumber Co Ltd
STIMBR	TPT Forests Limited
Westco Lagan Limited	WPI Timber, Prime Sawmill & Blue Mountain Lumber
Ecolab Limited	Genera Limited
Kwikill Environmental Services Limited	Rentokil Pest Control
Auckland Regional council	Marlborough District Council
Nelson City Council	Environment Bay of Plenty
Northland Regional council	

## Appendix C: Controls

### Commencement

1. These controls apply to methyl bromide.
2. Unless otherwise specified, the controls that applied to methyl bromide immediately before this approval continue in effect until the expiry of 30 April 2011. The controls set out in this Appendix take effect on 1 May 2011.

### Application

1. A person must not use methyl bromide otherwise than in accordance with these controls.
2. A person may use methyl bromide for quarantine and pre-shipment purposes in accordance with Tables C1, C2 and C4.
3. A person may use methyl bromide as a soil fumigant for the management and eradication of potato wart at residential properties for quarantine purposes in accordance with Tables C1, C3 and C4.

**Table C1: Controls applicable to all QPS uses of methyl bromide**

Hazardous Substances (Classes 1 to 5 controls) Regulations 2001				
Code F1	Reg 7	General test certification requirements for hazardous substance locations		
Code F2	Reg 8	Restrictions on the carriage of flammable substances on passenger service vehicles		
Code F3	Reg 55	General limits on flammable substances		
Code F5	Regs 58, 59	Requirements regarding hazardous atmosphere zones for class 2.1.1, 2.1.2 and 3.1 substances		
Code F6	Regs 60 – 70	Requirements to prevent unintended ignition of class 2.1.1, 2.1.2 and 3.1 substances		
Code F11	Reg 76	Segregation of incompatible substances		
Code F12	Regs 77	Requirement to establish a hazardous substance locations if flammable substances are present		
Code F14	Reg 81	Test certification requirements for facilities where class 2.1.1, 2.1.2 or 3.1 substances are present		
Code F16	Reg 83	Controls on transit depots where flammable substances are present		
Hazardous substances (Classes 6, 8, and 9 controls) Regulations 2001				
Code T1	Regs 11 – 27	Limiting exposure to toxic substances through the setting of tolerable exposure limits (TELs)		
	Tolerable exposure limits	The following TEL <sub>air</sub> values apply to <b>methyl bromide</b> :		
			TEL <sub>air</sub>	
			ppm	mg/m <sup>3</sup>
		1 hour	1	3.9
24 hour	0.333	1.3		
Chronic (annual average)	0.0013	0.005		

	Variation	Under s77A, the control imposed by regulation 27 is replaced by the following control: <b>27 Prohibition on use of methyl bromide in excess of tolerable exposure limit</b> A person in charge of a site and a person who uses methyl bromide must ensure that methyl bromide is used in a manner that does not result in a concentration of methyl bromide, in air at the boundary of the buffer zone, that exceeds the TEL <sub>air</sub> values.
Code T2	Regs 29, 30	Controlling exposure in places of work through the setting of WESs.
	Workplace exposure standards	Under section 77B, the Authority adopts as a workplace exposure standard for methyl bromide the values specified in the document described in “Workplace Exposure Standards and Biological Exposure Indices Effective 2010” published by the Department of Labour, September 2010, ISBN 978-0-478-36002-8. Also available at <a href="http://www.osh.dol.govt.nz/order/catalogue/pdf/wes2010.pdf">www.osh.dol.govt.nz/order/catalogue/pdf/wes2010.pdf</a> .
Code T3, E5	Regs 5, 6	Requirements for record keeping
	Variation	Under section 77A, the controls imposed by regulations 5 and 6 are replaced by additional control 2.
Code T4	Reg 7	Requirements for equipment used to handle substances
Code T5	Reg 8	Requirements for protective clothing and equipment
Code T6, E7	Reg 9	Approved handler/security requirements
	Variation	The following control 9A is in addition to the requirements imposed by regulation 9: <b>9A Exception to approved handler requirement for transportation of methyl bromide</b> (1) Regulation 9 is deemed to be complied with if— (a) in the case of methyl bromide being transported on land,— (i) if by rail, the person who drives the rail vehicle that is transporting the methyl bromide is fully trained in accordance with the approved safety system for the time being approved under section 6D of the Transport Services Licensing Act 1989; and (ii) in every other case, the person who drives, loads, and unloads the vehicle that is transporting the methyl bromide has a current dangerous goods endorsement on his or her driver licence; and (iii) in all cases, Land Transport Rule: Dangerous Goods 2005 (Rule 45001) is complied with; or (b) in the case of methyl bromide being transported by sea, one of the following is complied with: (i) Maritime Rules: Part 24A – Carriage of Cargoes – Dangerous Goods; or (ii) International Maritime Dangerous Goods Code.
Code T7	Reg 10	Restrictions on the carriage of toxic or corrosive substances on passenger service vehicles
Code E1	Regs 32 – 45	Limiting exposure to ecotoxic substances through the setting of environmental exposure limits (EELs).

	Variation	The default EELs given under regulation 32 of the Hazardous Substances (Classes 6, 8, and 9 controls) Regulations are deleted. No EELs are set for <b>methyl bromide</b> under section 77B.
Code E2	Regs 46 – 48	Restrictions on use of substances in application areas
Code E3	Reg 49	Use of substances ecotoxic to terrestrial invertebrates
Code E6	Reg 7	Requirements for equipment used to handle substances
<b>Hazardous Substances (Disposal) Regulations 2001</b>		
Code D2	Reg 6	Disposal requirements for flammable substances
Code D4	Reg 8	Disposal requirements for toxic and corrosive substances
Code D5	Reg 9	Disposal requirements for ecotoxic substances
Code D6	Reg 10	Disposal requirements for packages
Code D7	Regs 11, 12	Information requirements for manufacturers, importers and suppliers, and persons in charge
Code D8	Regs 13, 14	Documentation requirements for manufacturers, importers and suppliers, and persons in charge
<b>Hazardous Substances (Personnel Qualifications) Regulations 2001</b>		
Code AH1	Regs 4 – 6	Approved Handler requirements (including test certificate and qualification requirements)
<b>Hazardous Substances (Tracking) Regulations 2001</b>		
Code TR1	Regs 4(1), 5, 6	General tracking requirements
<b>Hazardous Substances (Emergency Management) Regulations 2001</b>		
Code EM1	Regs 6, 7, 9 – 11	Level 1 information requirements for suppliers and persons in charge
Code EM2	Reg 8(a)	Information requirements for corrosive substances
Code EM6	Reg 8(e)	Information requirements for toxic substances
Code EM7	Reg 8(f)	Information requirements for ecotoxic substances
Code EM8	Regs 12–16, 18–20	Level 2 information requirements for suppliers and persons in charge
Code EM9	Reg 17	Additional information requirements for flammable and oxidising substances and organic peroxides
Code EM10	Regs 21 – 24	Fire extinguisher requirements
Code EM11	Regs 25 – 34	Level 3 emergency management requirements: duties of person in charge, emergency response plans
Code EM13	Reg 42	Level 3 emergency management requirements: signage
<b>Hazardous Substances (Identification) Regulations 2001</b>		
Code I1	Regs 6, 7, 32–35, 36(1) – (7)	Identification requirements, duties of persons in charge, accessibility, comprehensibility, clarity and durability
	Variation	Under section 77A, the controls imposed by regs 34(1), (2), and (4), and regs 35(1), (3) and (5) are varied and added to by clause 12 in Table 2 and clause 6 in Table 3

Code I2	Reg 8	Priority identifiers for corrosive substances
Code I3	Reg 9	Priority identifiers for ecotoxic substances
Code I5	Reg 11	Priority identifiers for flammable substances
Code I8	Reg 14	Priority identifiers for toxic substances
Code I9	Reg 18	Secondary identifiers for all hazardous substances
Code I10	Reg 19	Secondary identifiers for corrosive substances
Code I11	Reg 20	Secondary identifiers for ecotoxic substances
Code I13	Reg 22	Secondary identifiers for flammable substances
Code I16	Reg 25	Secondary identifiers for toxic substances
Code I17	Reg 26	Use of generic names
Code I18	Reg 27	Requirements for using concentration ranges
Code I19	Regs 29 – 31	Additional information requirements, including situations where substances are in multiple packaging
Code I20	Reg 36(8)	Durability of information for class 6.1 substances
Code I21	Regs 37–39, 47–50	General documentation requirements
Code I22	Reg 40	Specific documentation requirements for corrosive substances
Code I23	Reg 41	Specific documentation requirements for ecotoxic substances
Code I25	Reg 43	Specific documentation requirements for flammable substances
Code I28	Reg 46	Specific documentation requirements for toxic substances
Code I29	Regs 51, 52	Signage requirements
Code I30	Reg 53	Advertising corrosive and toxic substances
<b>Hazardous Substances (Compressed Gases) Regulations 2004</b>		
Code CG		The Hazardous Substance (Compressed Gases) Regulations 2004 prescribe a number of controls relating to compressed gases and gas cylinders
<b>Hazardous Substances (Tank Wagon and Transportable Containers) Regulations 2004</b>		
Code TW	Variation	The requirements imposed as controls from the Hazardous Substances (Tank Wagons and Transportable Containers) Regulations 2004 are deleted
<b>Controlled substances licence</b>		
<b>Licence required</b>		
(1)	Subject to (2) and (3), a person must not possess <b>methyl bromide</b> unless that person has a valid licence for <b>methyl bromide</b> issued pursuant to section 95B of the HSNO Act.	
(2)	A person (Person A) may possess <b>methyl bromide</b> without the licence required by (1) if—	
	(a)	another person (Person B) has such a licence and is present and available immediately to Person A; or
	(b)	Person A complies with (3).
(3)	A person transporting <b>methyl bromide</b> may possess the substance without the licence required by (1) if:	

(a)	in the case of <b>methyl bromide</b> being transported on land,—	
	(i)	by rail, the person who drives the rail vehicle that is transporting the <b>methyl bromide</b> is fully trained in accordance with the approved safety system for the time being approved under section 6D of the Transport Services Licensing Act 1989; or
	(ii)	in every other case, the person who drives, loads, and unloads the vehicle that is transporting the <b>methyl bromide</b> has a current dangerous goods endorsement on his or her driver licence; and
	(iii)	in all cases, Land Transport Rule: Dangerous Goods 2005 (Rule 45001) is complied with; or
(b)	in the case of <b>methyl bromide</b> being transported by sea, one of the following is complied with:	
	(i)	Maritime Rules: Part 24A – Carriage of Cargoes – Dangerous Goods; or
	(ii)	International Maritime Dangerous Goods Code.
<b>Controls relating to the adverse effects of unintended ignition</b>		
Code GN35A	Schedule 10	The controls set out in Schedule 10 of the Hazardous Substances (Dangerous Goods and Scheduled Toxic Substances) Transfer Notice 2004 apply to <b>methyl bromide</b> .
Variation		Clause 1. This clause applies to <b>methyl bromide</b> as if the words “Schedule 1 provided that for the purposes of this Schedule, low flashpoint diesel (low flash domestic heating oil and alpine diesel) shall be deemed to have a flammable classification of 3.1D” was replaced by: “ <b>methyl bromide</b> ”.

**Table C2: Additional controls for the QPS (other than soil fumigation) of methyl bromide**

Clause	Control description
1.	<b>Restriction on fumigation</b> A person may only <b>apply methyl bromide</b> into an <b>enclosed space</b> .
2.	<b>Collecting data</b> (1) A person who <b>uses methyl bromide</b> must ensure that accurate records are kept of the data specified in clauses 2(2) to 2(4) for each <b>application</b> . (2) Where <b>recapture technology</b> is used, the: (a) date and time of each <b>application</b> and recapture; (b) <b>location</b> where the <b>methyl bromide</b> was <b>applied</b> and recaptured; (c) amount of <b>methyl bromide applied</b> and recaptured; (d) type of <b>enclosed space</b> to which the <b>methyl bromide</b> was applied; (e) capacity of the <b>enclosed space</b> ; and (f) name of the person <b>using methyl bromide</b> and the physical address of their place of work. (3) Where <b>recapture technology</b> is not used, the: - (a) date and time of each <b>application</b> and <b>ventilation</b> ; (b) amount of <b>methyl bromide applied</b> ; (c) <b>location</b> where the <b>methyl bromide</b> was <b>applied</b> and <b>ventilated</b> ; (d) wind speed and direction every 3 minutes at the <b>location</b> during <b>ventilation</b> ;

	<ul style="list-style-type: none"> <li>(e) type of <b>enclosed space</b> to which the <b>methyl bromide</b> was applied;</li> <li>(f) capacity of the <b>enclosed space</b>;</li> <li>(g) name of the person <b>using methyl bromide</b> and the physical address of their place of work;</li> <li>(h) for each <b>monitoring location, exposure levels</b>; and</li> <li>(i) for each <b>monitoring location</b>, the type and location of the monitoring equipment used to record the <b>exposure levels</b>.</li> </ul> <p>(4) For each <b>discharge of methyl bromide</b>, the:</p> <ul style="list-style-type: none"> <li>(a) date and time of each <b>discharge</b>;</li> <li>(b) approximate amount of <b>methyl bromide discharged</b>;</li> <li>(c) <b>location</b> where the <b>methyl bromide</b> was <b>discharged</b>;</li> <li>(d) approximate wind speed and direction at the <b>location</b> when the <b>discharge</b> occurred;</li> <li>(e) where the <b>discharge</b> occurred from;</li> <li>(f) the reason why the <b>discharge</b> occurred;</li> <li>(g) capacity of the <b>enclosed space</b>; and</li> <li>(h) name of the person <b>using methyl bromide</b> and the physical address of their place of work.</li> </ul> <p>(5) The data required to be recorded by clause 2, must be recorded every 3 minutes from the start of <b>ventilation</b> until the <b>exposure level</b> is below 0.05 ppm for at least:</p> <ul style="list-style-type: none"> <li>(a) 15 minutes, where 7 kg or more of <b>methyl bromide</b> is <b>applied</b> in a one hour period; or</li> <li>(b) 3 minutes where less than 7 kg of <b>methyl bromide</b> is <b>applied</b> in a one hour period.</li> </ul>
3.	<p><b>1 hour and 24 hour exposure levels</b></p> <p>(1) The <b>person in charge</b> of the <b>site</b> must, for each <b>monitoring location</b>, keep a record of the following information for every <b>ventilation</b>:</p> <p><b>1 hour exposure level</b>; and  <b>24 hour exposure level</b>.</p> <p>(2) The <b>person in charge</b> of the <b>site</b> must notify Department of Labour and the relevant Medical Officer of Health as soon as practicable, but within 5 working days, if either the:</p> <ul style="list-style-type: none"> <li>(a) <b>1 hour exposure level</b> exceeds the 1 hour TEL<sub>air</sub> value for <b>methyl bromide</b>; or</li> <li>(b) <b>24 hour exposure level</b> exceeds the 24 hour TEL<sub>air</sub> value for <b>methyl bromide</b>.</li> </ul>
4.	<p><b>Record keeping</b></p> <p>The records required by clauses 2 and 3 must be kept for not less than 7 years after the date that the <b>fumigations</b> to which they relate occurred and be available for inspection.</p>
5.	<p><b>Annual monitoring report</b></p> <p>(1) The <b>person in charge</b> of a <b>site</b> where more than the reporting threshold set out in clause 5(2) is applied must produce an <b>annual monitoring report</b>.</p> <p>(2) The reporting threshold is 500 kg or more of <b>methyl bromide</b> in one <b>calendar year</b> at a <b>site</b>.</p> <p>(3) <b>Methyl bromide</b> that is recaptured using <b>recapture technology</b> does not count towards the reporting threshold set out in clause 5(2).</p> <p>(4) The <b>annual monitoring report</b> shall contain the following information in respect of the calendar year:</p>

	<p>(a) the number of <b>fumigations</b> using <b>methyl bromide</b> carried out at the <b>site</b>;</p> <p>(b) the total amount of <b>methyl bromide applied</b> at the <b>site</b>;</p> <p>(c) the types of <b>enclosed spaces</b> to which <b>methyl bromide</b> has been applied;</p> <p>(d) the types of equipment used to carry out the monitoring of <b>methyl bromide</b>;</p> <p>(e) the <b>annual exposure level</b>;</p> <p>(f) approximate total amount of <b>methyl bromide discharged</b>;</p> <p>(g) number of notifications made in accordance with clause 3(2), identified by each <b>monitoring location</b>;</p> <p>(h) how many times the <b>exposure levels</b> exceeded the TEL<sub>air</sub> value;</p> <p>(i) if a breach of a TEL<sub>air</sub> value has occurred, an outline of what risk mitigation measures have been or are being put in place; and</p> <p>(j) any accidents or other issues related to non-compliance with any of the controls under this approval.</p> <p>(5) The <b>person in charge</b> of the <b>site</b> must provide the <b>annual monitoring report</b> to ERMA New Zealand, Department of Labour, and the relevant Medical Officer of Health by 30 June of the following year.</p>												
6.	<p><b>Minimum buffer zones</b></p> <p>(1) The <b>person in charge</b> of a <b>site</b> must set a <b>buffer zone</b> for each <b>fumigation</b>. The <b>buffer zone</b> must be equal to or greater than the following distances:</p> <table border="1"> <thead> <tr> <th>Use</th> <th>Minimum buffer zones (in metres)</th> </tr> </thead> <tbody> <tr> <td>Ship's hold (1000 kg or more of <b>methyl bromide applied per site</b> in any 24 hour period)</td> <td>100</td> </tr> <tr> <td>Ship's hold (less than 1000 kg <b>methyl bromide applied per site</b> in any 24 hour period)</td> <td>50</td> </tr> <tr> <td><b>Fumigation under sheets</b></td> <td>50</td> </tr> <tr> <td><b>Containers</b> (total volume of 77 m<sup>3</sup> or more in any 60 minute period)</td> <td>25</td> </tr> <tr> <td><b>Containers</b> (total volume of less than 77 m<sup>3</sup> in any 60 minute period)</td> <td>10</td> </tr> </tbody> </table> <p>(2) Subject to clause 6(3), the <b>person in charge</b> of the <b>site</b> and any person who <b>uses methyl bromide</b> must ensure that <b>non-occupational bystanders</b> are not in the <b>buffer zone</b> during the <b>buffer zone period</b>.</p> <p>(3) Where a <b>buffer zone</b> extends over water, the <b>person in charge</b> of the <b>site</b> and any person who <b>uses methyl bromide</b> must take all practicable steps to ensure that the water is monitored and, if a <b>non-occupational bystander</b> enters the <b>buffer zone</b>, that the bystander moves out of the <b>buffer zone</b> as soon as practicable.</p> <p>(4) The requirement to comply with the <b>buffer zone</b> distances required by clause 6(1) does not apply to a <b>person in charge</b> of a <b>site</b> who complies with a relevant code of practice approved under section 78 of the HSNO Act.</p> <p>(5) The requirement to comply with the <b>buffer zone</b> distances required by clause 6(1) does not apply to a <b>fumigation</b> where <b>recapture technology</b> is used.</p> <p>(6) A person must not <b>use methyl bromide within 25 metres</b> of any <b>sensitive site</b>.</p>	Use	Minimum buffer zones (in metres)	Ship's hold (1000 kg or more of <b>methyl bromide applied per site</b> in any 24 hour period)	100	Ship's hold (less than 1000 kg <b>methyl bromide applied per site</b> in any 24 hour period)	50	<b>Fumigation under sheets</b>	50	<b>Containers</b> (total volume of 77 m <sup>3</sup> or more in any 60 minute period)	25	<b>Containers</b> (total volume of less than 77 m <sup>3</sup> in any 60 minute period)	10
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<b>Fumigation under sheets</b>	50												
<b>Containers</b> (total volume of 77 m <sup>3</sup> or more in any 60 minute period)	25												
<b>Containers</b> (total volume of less than 77 m <sup>3</sup> in any 60 minute period)	10												
7.	<p><b>Site must be secured</b></p> <p><b>Fumigation</b> may only be carried out in a place that is secured against ready access by unauthorised persons.</p>												
8.	<p><b>Container must not be moved during fumigation</b></p>												



	<p>(1) A person must not move a <b>container</b> during <b>fumigation</b>.</p> <p>(2) However, a person may move a <b>container</b> during <b>fumigation</b> from a:</p> <p>(a) wharf to a ship that is berthed at that wharf; or</p> <p>(b) ship to a wharf where that ship is berthed.</p>								
9.	<p><b>Container must be gas tight</b></p> <p>A person may not <b>apply methyl bromide</b> in a <b>container</b> unless:</p> <p>(a) the <b>container</b> is in good repair and capable of being securely closed; and</p> <p>(b) the <b>container</b> does not leak at any of the temperatures and/or pressures to which the <b>container</b> will be made subject.</p>								
10.	<p><b>Requirements for sheets</b></p> <p>A person must not <b>apply methyl bromide</b> under <b>sheets</b> unless the <b>sheet</b> is:</p> <p>(a) in good repair without tears, rips or visible holes; and</p> <p>(b) made secure against likely weather conditions at the <b>site</b>; and</p> <p>(c) sealed with a border that is filled with heavy material.</p>								
11.	<p><b>Notification of intended fumigation</b></p> <p>(1) A person who <b>applies methyl bromide</b> must notify in writing the relevant persons (specified in the table) of the intention to carry out <b>fumigation</b> at least 24 hours prior to <b>applying the methyl bromide</b>.</p> <table border="1" data-bbox="359 974 1133 1254"> <thead> <tr> <th>Type of application</th> <th>Relevant persons to be notified</th> </tr> </thead> <tbody> <tr> <td>Ship's hold</td> <td> <ul style="list-style-type: none"> <li>• The nearest communications centre of the New Zealand Fire Service; and</li> <li>• <b>Person in charge</b> of the <b>site</b>.</li> </ul> </td> </tr> <tr> <td><b>Sheets</b></td> <td> <ul style="list-style-type: none"> <li>• The nearest communications centre of the New Zealand Fire Service; and</li> <li>• <b>Person in charge</b> of the <b>site</b>.</li> </ul> </td> </tr> <tr> <td><b>Container</b></td> <td> <ul style="list-style-type: none"> <li>• <b>Person in charge</b> of the <b>site</b>.</li> </ul> </td> </tr> </tbody> </table> <p>(2) A person who applies <b>methyl bromide</b> must also notify the occupants of each property within 25 metres of the <b>site</b> to be <b>fumigated</b> at least 24 hours prior to <b>applying the methyl bromide</b>.</p> <p>(3) Where a marae is adjacent to a <b>site</b> to be fumigated, the person who applies methyl bromide must make appropriate notification arrangements with local Māori;</p> <p>(4) However, notification of the persons specified in clauses 11(1) and 11(2) may be less than 24 hours if the <b>fumigation</b> is urgent for a reason or reasons relating to public health or biosecurity.</p> <p>(5) A person who intends to <b>apply</b> more than 100 kg of <b>methyl bromide</b> in a 24 hour period must notify the occupants of each property, including moored boats, within 100 m of the <b>site</b> at least 24 hours prior to <b>applying the methyl bromide</b>.</p> <p>(6) At the end of the <b>buffer zone period</b> the person who applied the <b>methyl bromide</b> must notify every person required to be notified under clauses 11(1) to 11(4) that <b>fumigation</b> is complete.</p> <p>(7) The requirement to notify persons under clauses 11(1) to 11(6) is met if the:</p> <p>(a) <b>fumigation</b> is carried out at the <b>site</b> on a weekly basis; and</p> <p>(b) the relevant persons are notified of the intention to carry out regular <b>fumigations</b> at the <b>site</b> initially and then again annually setting out:</p> <p>(i) where the <b>fumigation</b> occurs;</p> <p>(ii) the time at which <b>ventilation</b> normally occurs (if this can be</p>	Type of application	Relevant persons to be notified	Ship's hold	<ul style="list-style-type: none"> <li>• The nearest communications centre of the New Zealand Fire Service; and</li> <li>• <b>Person in charge</b> of the <b>site</b>.</li> </ul>	<b>Sheets</b>	<ul style="list-style-type: none"> <li>• The nearest communications centre of the New Zealand Fire Service; and</li> <li>• <b>Person in charge</b> of the <b>site</b>.</li> </ul>	<b>Container</b>	<ul style="list-style-type: none"> <li>• <b>Person in charge</b> of the <b>site</b>.</li> </ul>
Type of application	Relevant persons to be notified								
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<b>Sheets</b>	<ul style="list-style-type: none"> <li>• The nearest communications centre of the New Zealand Fire Service; and</li> <li>• <b>Person in charge</b> of the <b>site</b>.</li> </ul>								
<b>Container</b>	<ul style="list-style-type: none"> <li>• <b>Person in charge</b> of the <b>site</b>.</li> </ul>								

	<p>specified);</p> <p>(iii) the expected frequency of <b>fumigation</b>; and</p> <p>(iv) any likely seasonal trends.</p> <p>(8) Clauses 11(2), (3), (5) and (6) do not apply to a <b>fumigation</b> when <b>recapture technology</b> is used.</p>
12.	<p><b>Fumigation warning</b> <i>Clause 12 title: amended on June 2011 under section 67A</i></p> <p><u>(1) A person who applies <b>methyl bromide</b> must ensure that persons approaching the <b>buffer zone</b> are warned that a <b>methyl bromide fumigation</b> is taking place.</u></p> <p><u>(1A) For those parts of a <b>buffer zone</b> that extend over land, the warning required by clause 12(1) must be provided by displaying a sign that complies with clause 12(2) at every point of access to the <b>buffer zone</b>.</u></p> <p><u>(1B) For those parts of a <b>buffer zone</b> that extend over water, the warning required by clause 12(1) must be able to be readily seen by a person approaching the <b>buffer zone</b> from a seaward direction including during the hours of darkness.</u></p> <p><i>Clause 12 (1): amended on June 2011 under section 67A.</i></p> <p>(2) The signs must:</p> <p>(a) <b>state that fumigation is being carried out; and</b></p> <p>(b) state that <b>methyl bromide</b> is being used; and</p> <p>(c) state that <b>methyl bromide</b> is toxic to humans; and</p> <p>(d) describe the general type of hazard associated with <b>methyl bromide</b>; and</p> <p>(e) describe the precautions necessary to prevent unintended ignition of <b>methyl bromide</b>; and</p> <p>(f) comply with regulation 34(1), (2), and (4), and regulation 35(1), (3), and (5) of the Hazardous Substances (Identification) Regulations 2001, but as if the distances referred to in regulation 35(3) were a distance of not less than 10 metres; and</p> <p>(g) identify the <b>person in charge</b> of the <b>site</b> and the person <b>using methyl bromide</b> and provide sufficient information to enable the persons to be contacted during normal business hours; and</p> <p>(h) state the date on which the <b>fumigation</b> commenced; and</p> <p>(i) be illuminated during the hours of darkness; and</p> <p>(j) be able to be readily seen by a person approaching the <b>buffer zone</b>.</p> <p><i>Clause 12 (2): amended on June 2011 under section 67A.</i></p> <p><u>(3) A person who applies <b>methyl bromide</b> must ensure that physical warnings that are used to comply with clause 12(1) are removed at the end of the <b>buffer zone period</b>.</u></p> <p><i>Clause 12 (3): amended on June 2011 under section 67A.</i></p>
13.	<p><b>Requirement for recapture technology</b></p> <p>(1) Clause 13(2) takes effect 10 years after the date of this approval.</p> <p>(2) A person must not <b>apply methyl bromide</b> unless <b>recapture technology</b> is used.</p> <p>(3) A person who <b>applied methyl bromide</b> in the preceding calendar year must provide a report to ERMA New Zealand by 30 June each year setting out that person's progress in introducing <b>recapture technology</b>.</p>

Deleted: Signage

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Deleted: A person who applies **methyl bromide** must ensure that signs are displayed at every point of access to the **buffer zone**.

Deleted: required by clause 12(1)

Deleted: , including, when applicable, persons approaching from a seaward direction.

Deleted: The signs required by clause 12(1) must be removed at the end of the **buffer zone period**.

**Table C3: Specific controls for use of methyl bromide in soil fumigation for potato wart**

Clause	Specific controls for use of methyl bromide in soil fumigation for potato wart
1.	Authorised person

	A person must not <b>apply methyl bromide</b> to fumigate soil for potato wart unless they are an <b>authorised person</b> or a person working under the direct supervision of an <b>authorised person</b> .
2.	<b>Maximum application rate</b> A person must not <b>apply</b> more than 380 grams of <b>methyl bromide</b> per square metre of soil.
3.	<b>Sheets</b> (1) A person must only <b>apply methyl bromide</b> to soil that is covered by a <b>sheet</b> . (2) The <b>authorised person</b> who <b>applied</b> or supervised the <b>application</b> of <b>methyl bromide</b> must ensure that: (a) the <b>sheet</b> remains in place for at least 24 hours after <b>methyl bromide</b> is <b>applied</b> ; and (b) where more than one <b>sheet</b> is used, adjacent <b>sheets</b> must overlap by a minimum of 50 millimetres and be securely bonded; and (c) the <b>sheet</b> is secure against likely weather conditions at the <b>site</b> ; and (d) the <b>sheet</b> is sealed with a border trench that is filled with heavy material; and (e) the <b>sheet</b> is removed by slowly rolling it off the <b>fumigated</b> soil.
4.	<b>Notification</b> (1) A person who <b>applies methyl bromide</b> must notify the relevant Medical Officer of Health and the nearest communications centre of the New Zealand Fire Service in writing at least 48 hours prior to <b>applying methyl bromide</b> . (2) A person who <b>applies methyl bromide</b> must also notify the occupant of every property within 25 metres of the <b>site</b> to be <b>fumigated</b> at least 24 hours prior to <b>applying the methyl bromide</b> . (3) A person who <b>applies methyl bromide</b> must notify the <b>person in charge</b> of each <b>sensitive site</b> within 100 m of the <b>site</b> at least 48 hours prior to <b>applying the methyl bromide</b> .
5.	<b>Evacuation and access to site</b> A person who <b>applies methyl bromide</b> must ensure that no <b>non-occupational bystander</b> is at the residential property from the time that <b>methyl bromide</b> is <b>applied</b> until either: (a) 24 hours after the <b>sheet</b> is removed; or (b) following the removal of the <b>sheet</b> , the time when the concentration of <b>methyl bromide</b> measured at 30 cm above the treated soil has been less than 0.05 ppm for a period of 15 minutes.
6.	<b>Signage</b> (1) A person who applies <b>methyl bromide</b> must ensure that signs are displayed at every point of access to the area treated with <b>methyl bromide</b> . (2) The signs required by clause 6(1) must: (a) state that <b>fumigation</b> is being carried out; and (b) state that <b>methyl bromide</b> is being used; and (c) state that <b>methyl bromide</b> is toxic to humans; and (d) describe the general type of hazard associated with <b>methyl bromide</b> ; and (e) describe the precautions necessary to prevent unintended ignition of <b>methyl bromide</b> ; and (f) comply with regulation 34(1), (2), and (4), and regulation 35(1), (3), and (5) of the Hazardous Substances (Identification) Regulations 2001, but as if the distances referred to in regulation 35(3) were a distance of not less than 10 meters; and (g) identify the <b>authorised person</b> and provide sufficient information to enable the person to be contacted during normal business hours; and

	<p>(h) state the date on which the <b>fumigation</b> commenced; and</p> <p>(i) be illuminated during the hours of darkness; and</p> <p>(j) be able to be readily seen by a person approaching the area treated with <b>methyl bromide</b>.</p>
(3)	<p>The signs required by clause 6(1) may be removed:</p> <p>(a) 24 hours after the <b>sheet</b> is removed; or</p> <p>(b) when the concentration of <b>methyl bromide</b> measured at 30 cm above the treated soil has been less than 0.05 ppm for a period of 15 minutes.</p>

**Table C4: Interpretation**

<p><b>1 hour exposure level</b> means the average <b>exposure level</b> for each 60 minute time period from the start of <b>ventilation</b> until the end of the <b>buffer zone period</b>.</p>
<p><b>24 hour exposure level</b> means the average <b>exposure level</b> for each 24 hour time period from the start of <b>ventilation</b> until the end of the <b>buffer zone period</b>.</p>
<p><b>Annual exposure level</b> means the total <b>24 hour exposure level</b> recorded over a calendar year and averaged over 365 days.</p>
<p><b>Apply, applied, and application</b> include injecting methyl bromide into an enclosed space.</p>
<p><b>Authorised person</b> means a person with a relevant appointment as an authorised person under s 103 of the Biosecurity Act 1993.</p>
<p><b>Buffer zone</b> means an area extending outward in all directions from the perimeter of each <b>enclosed space</b> being <b>fumigated</b> to the relevant distance specified in the clause 6(1) of Table 2.</p>
<p><b>Buffer zone period</b> means the period of time starting when <b>methyl bromide</b> is first <b>applied</b> to an <b>enclosed space</b> and lasts until the data required by clause 2 of Table 2 is no longer required to be recorded.</p>
<p><b>Container</b> means anything used to contain <b>methyl bromide</b> during <b>fumigation</b> except a:</p> <ol style="list-style-type: none"> <li>1. ship's hold; and</li> <li>2. <b>sheet</b>.</li> </ol>
<p><b>Discharge</b> means the unintentional release of <b>methyl bromide</b> into open air.</p>
<p><b>Enclosed space</b> means a:</p> <ol style="list-style-type: none"> <li>1. <b>container</b>; and</li> <li>2. <b>sheet</b>; and</li> <li>3. ship's hold.</li> </ol>
<p><b>Exposure level</b> means the concentration of <b>methyl bromide</b> in the air recorded at the <b>monitoring location</b>.</p>
<p><b>Fumigation</b> means the <b>application</b> and <b>ventilation</b> of <b>methyl bromide</b> for the purpose of destruction of rodents, pests, or other plant or animal organisms or fungi.</p>
<p><b>Location</b> means where on the <b>site</b> the <b>fumigation</b> is occurring (recorded as either New Zealand Mapping Series grid references or on a map with a resolution of at least 1:10000).</p>

<p><b>Methyl bromide</b> means a gas containing 1000 g/kg methyl bromide.</p>
<p><b>Monitoring location</b> means the point on land at the edge of the <b>buffer zone</b> that is in the most downwind direction from the <b>enclosed space</b> being <b>ventilated</b>.</p>
<p><b>Non-occupational bystander</b> means any person who is not employed to work at the <b>site</b> where the <b>fumigation</b> is occurring.</p>
<p><b>Person in charge</b>, in relation to a <b>site</b> where <b>fumigation</b> is or is intended to be carried out, means a person who is—</p> <ol style="list-style-type: none"> <li>1. the owner, lessee, sublessee, occupier, or person in possession of the <b>site</b>, or any part of it; or</li> <li>2. any other person who, at the relevant time, is in effective control or possession of the relevant part of the <b>site</b>.</li> </ol>
<p><b>Recapture technology</b> means a system that mitigates <b>methyl bromide</b> emissions from <b>fumigation</b> enclosures such that the residual level of <b>methyl bromide</b> in the <b>enclosed space</b> is less than the Worker Exposure Standard set under section 77B.</p>
<p><b>Sensitive site</b> means a place where members of the public are likely to be present and are unable to readily evacuate themselves, such as a school, playground, early childhood centre, prison, hospital or long-term care facility.</p>
<p><b>Sheet</b> means a heavy duty polyethylene cover which is:</p> <ol style="list-style-type: none"> <li>1. gas-proof;</li> <li>2. water-proof; and</li> <li>3. non-permeable.</li> </ol>
<p><b>Site</b> means:</p> <p>Where the methyl bromide is used:</p> <ol style="list-style-type: none"> <li>1. an area of land which is: <ol style="list-style-type: none"> <li>(a) comprised of a single allotment, or other legally defined parcel of land and held in a single certificate of title; or</li> <li>(b) comprised of a single allotment or legally defined parcel of land for which a separate certificate of title could be issued without further consent of the Council, being in any case the smaller of land area i) or ii); or</li> </ol> </li> <li>2. an area of land which is comprised of two or more adjoining legally defined parcels of land held together in one certificate of title in such a way that the lots cannot be dealt with separately without prior consent of the Council; or</li> <li>3. an area of land which is comprised of two or more adjoining certificates of title where such titles are: <ol style="list-style-type: none"> <li>(a) subject to a condition imposed under section 37 of the Building Act or section 240 Resource Management Act 1991; or</li> <li>(b) held together in such a way that they cannot be dealt with separately without the prior consent of the Council; and</li> </ol> </li> <li>4. in the case of land subdivided under the cross lease or company lease systems (other than strata titles), site shall mean an area of land containing: <ol style="list-style-type: none"> <li>(a) a building or buildings for residential or business purposes with any accessory building, plus any land exclusively restricted to the users of that building; or</li> </ol> </li> </ol>

- (b) a remaining share or shares in the fee simple creating a vacant part of the whole for future cross lease or company lease purposes; and
5. in the case of land subdivided under the Unit Titles Act 1972 (other than strata titles), site shall mean an area of land containing a principal unit or proposed unit on a unit plan together with its accessory units;
- (a) in the case of strata titles, site shall mean the underlying certificate of titles, immediately prior to subdivision; and
- (b) in the case of an activity that occupies more than one adjoining allotment, whether held in single legal title or multiple titles, for the purpose of compliance with any rules that specify a level of effect at the boundary or that specify capacities or discharge quantities, then the site shall be the total area of land occupied by that activity, and boundary shall be the boundary around that area of land. "Adjoining" (in the context of this definition) includes otherwise contiguous allotments which are straddled by a vehicle access or a legal road.

**Use includes applying, discharging, and ventilating methyl bromide.**

**Ventilate and Ventilation** mean the release of **methyl bromide** into the atmosphere.

## Appendix D: Qualitative descriptors for risk/benefit assessment

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### D1 Assessing risks, costs and benefits qualitatively

This section describes how ERMA New Zealand addresses the qualitative assessment of risks, costs and benefits. Risks and benefits are assessed by estimating the magnitude and nature of the possible effects and the likelihood of their occurrence. For each effect, the combination of these two components determines the level of the risk associated with that effect, which is a two dimensional concept. Because of lack of data, risks are often presented as singular results. In reality, they are better represented by ‘families’ of data which link probability with different levels of outcome (magnitude).

### D2 Describing the magnitude of effect

The magnitude of effect is described in terms of the element that might be affected. The qualitative descriptors for magnitude of effect are surrogate measures that should be used to gauge the end effect or the ‘what if’ element. Tables 1 and 2 contain generic descriptors for magnitude of adverse and beneficial effect. These descriptors are examples only, and their generic nature means that it may be difficult to use them in some particular circumstances. They are included here to illustrate how qualitative tables may be used to represent levels of adverse and beneficial effect.

The sample qualitative descriptors for effects on the market economy listed in the ERMA New Zealand technical guide to decision making<sup>28</sup> include representative numbers. These ‘economic’ descriptors were developed prior to the publication of the technical guide on identification and assessment of effects on the market economy,<sup>29</sup> which refines the approach that ERMA New Zealand applies to identifying and assessing economic effects. These numbers do not align well with the qualitative descriptors in the other categories (effects on the environment, effects on human health, and effects on society and communities), as they relate more to an event than an effect. In particular the numbers are unclear about how they take account of time (are they annual, or over the life of the activity) and they do not have a local, regional or national context.

ERMA New Zealand has adopted a revised set of qualitative descriptors for the magnitude of effect on the market economy, as shown below.

**Table D1: Magnitude of adverse effects (risks and costs)**

Descriptor	Examples of descriptions - Adverse
Minimal	Mild reversible short term adverse health effects to individuals in highly localised area

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<sup>28</sup> ERMA New Zealand. 2004. *Decision Making: A Technical Guide to Identifying, Assessing and Evaluating Risks, Costs and Benefits*, ER-TG-05-01. Wellington: Environmental Risk Management Authority.

<sup>29</sup> ERMA New Zealand. 2005. *Assessment of Economic Risks, Costs and Benefits: Consideration of Impacts on the Market Economy*, ER-TG-06-01. Wellington: Environmental Risk Management Authority.

	<p>Highly localised and contained environmental impact, affecting a few (less than ten) individuals members of communities of flora or fauna, no discernible ecosystem impact</p> <p>Local/regional short-term adverse economic effects on small organisations (businesses, individuals), temporary job losses</p> <p>No social disruption</p>
Minor	<p>Mild reversible short term adverse health effects to identified and isolated groups</p> <p>Localised and contained reversible environmental impact, some local plant or animal communities temporarily damaged, no discernible ecosystem impact or species damage</p> <p>Regional adverse economic effects on small organisations (businesses, individuals) lasting less than six months, temporary job losses</p> <p>Potential social disruption (community placed on alert)</p>
Moderate	<p>Minor irreversible health effects to individuals and/or reversible medium term adverse health effects to larger (but surrounding) community (requiring hospitalisation)</p> <p>Measurable long term damage to local plant and animal communities, but no obvious spread beyond defined boundaries, medium term individual ecosystem damage, no species damage</p> <p>Medium term (one to five years) regional adverse economic effects with some national implications, medium term job losses</p> <p>Some social disruption (e.g. people delayed)</p>
Major	<p>Significant irreversible adverse health effects affecting individuals and requiring hospitalisation and/or reversible adverse health effects reaching beyond the immediate community</p> <p>Long term/irreversible damage to localised ecosystem but no species loss</p> <p>Measurable adverse effect on GDP, some long-term (more than five years) job losses</p> <p>Social disruption to surrounding community, including some evacuations</p>
Massive	<p>Significant irreversible adverse health effects reaching beyond the immediate community and/or deaths</p> <p>Extensive irreversible ecosystem damage, including species loss</p> <p>Significant on-going adverse effect on GDP, long-term job losses on a national basis</p> <p>Major social disruption with entire surrounding area evacuated and impacts on wider community</p>

**Table D2: Magnitude of positive effects (benefits)**

Descriptor	Examples of descriptions - Positive
Minimal	<p>Mild short-term positive health effects to individuals in highly localised area</p> <p>Highly localised and contained environmental impact, affecting a few (less than 10) individuals members of communities of flora or fauna, no discernible ecosystem impact</p> <p>Local/regional short-term positive economic effects on small organisations (businesses, individuals), temporary job creation</p> <p>No social effect</p>
Minor	<p>Mild short-term positive health effects to identified and isolated groups</p>



	<p>Localised and contained positive environmental impact, no discernible ecosystem impact</p> <p>Regional positive economic effects on small organisations (businesses, individuals) lasting less than six months, temporary job creation</p> <p>Minor localised community benefit</p>
Moderate	<p>Minor health benefits to individuals and/or medium term health impacts on larger (but surrounding) community and health status groups</p> <p>Measurable benefit to localised plant and animal communities expected to pertain to medium term</p> <p>Medium term (one to five years) regional positive economic effects with some national implications, medium term job creation</p> <p>Local community and some individuals beyond immediate community receive social benefit.</p>
Major	<p>Significant positive health effects to localised community and specific groups in wider community</p> <p>Long-term benefit to localised ecosystem(s)</p> <p>Measurable positive effect on GDP, some long-term (more than five years) job creation</p> <p>Substantial social benefit to surrounding community, and individuals in wider community.</p>
Massive	<p>Significant long term positive health effects to the wider community</p> <p>Long-term, wide spread benefits to species and/or ecosystems</p> <p>Significant on-going effect positive on GDP, long-term job creation on a national basis</p> <p>Major social benefit affecting wider community</p>

### D3 Determining the likelihood of the end effect

Likelihood in this context applies to the composite likelihood of the end effect, and not either to the initiating event, or any one of the intermediary events. It includes:

- the concept of an initiating event (triggering the hazard), and
- the exposure pathway that links the source (hazard) and the area of impact (public health, environment, economy, or community).

Thus, the likelihood is not the likelihood of an organism escaping, or the frequency of accidents for trucks containing hazardous substances, but the likelihood of the specified adverse effect<sup>30</sup> resulting from that initiating event. It will be a combination of the likelihood of the initiating event and several intermediary likelihoods<sup>31</sup>. The best way to determine the likelihood is to specify and analyse the complete pathway from source to impact.

Likelihood may be expressed as a frequency or a probability. While frequency is often expressed as a number of events within a given time period, it may also be expressed as the

<sup>30</sup> The specified effect refers to scenarios established in order to establish the representative risk, and may be as specific as x people suffering adverse health effects, or y% of a bird population being adversely affected. The risks included in the analysis may be those related to a single scenario, or may be defined as a combination of several scenarios.

<sup>31</sup> Qualitative event tree analysis may be a useful way of ensuring that all aspects are included.

number of events per head of (exposed) population. As a probability, the likelihood is dimensionless and refers to the number of events of interest divided by the total number of events (range 0–1).

**Table D3: Likelihood**

Descriptor	Description
Highly improbable	Almost certainly not occurring but cannot be totally ruled out
Very unlikely	Considered only to occur in very unusual circumstances
Unlikely (occasional)	Could occur, but is not expected to occur under normal operating conditions
Likely	A good chance that it may occur under normal operating conditions
Highly likely	Almost certain, or expected to occur if all conditions met

#### **D4 Using magnitude and likelihood to construct risk**

Using the magnitude and likelihood tables a matrix representing a level of risk can be constructed (Table D4).

**Table D4: Level of risk**

Likelihood	Magnitude of effect				
	Minimal	Minor	Moderate	Major	Massive
Highly improbable	A	A	A	B	B
Very unlikely	A	A	B	B	C
Unlikely	A	B	B	C	C
Likely	B	B	C	C	D
Highly likely	B	C	C	D	D

The level of risk/benefit can be assigned as follows in Table D5.

**Table D5: Assignment of level of risk/benefit**

A	Negligible
B	Low
C	Medium
D	High

## Appendix E: Abbreviations and acronyms

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ACVM Act	Agricultural Compounds and Veterinary Medicines Act 1996
CSL	controlled substance licence
CUE	critical use exemption
DOL	Department of Labour
EELS	environmental exposure limits
HSNO Act	Hazardous Substances and New Organisms Act 1996
ISO	International Organization for Standardization
LOAEL	lowest observable adverse effect level
MAFBNZ	Ministry of Agriculture and Forestry (MAF) Biosecurity New Zealand
NOAEL	no-observed adverse effect level
NZFPPIA	New Zealand Fresh Produce Importer Association
OEHHA	Office of the Environmental Health Hazard Assessment
PEL	permissible exposure limit
PIDs	photoionisation detectors
PMANZ	Pest Management Association of New Zealand
QPS	quarantine on pre-shipment
RMA	Resource Management Act 1991
RPE	respiratory protective equipment
STIMBR	Stakeholders in Methyl Bromide Reduction
TEL	tolerable exposure level
UV	ultra violet
WES	workplace exposure standard