



Environmental
Protection Authority
Te Mana Rauhi Taiao

Methyl bromide fumigations

Post-reassessment guidance for fumigators

APRIL 2011



TECHNICAL GUIDE

Introduction

The Authority's decision in November 2010 to allow the continued use of the fumigant methyl bromide followed an extensive reassessment of the substance's use in New Zealand.

Methyl bromide helps to protect New Zealand's environment from the adverse impacts of pest species. It is also required by the country's trading partners for the treatment of timber exports as a biosecurity measure.

The new rules for the management of methyl bromide aim at minimising the level of public exposure to the fumigant and include setting minimum buffer zones around fumigation sites, providing for notification to nearby residents and requiring users to monitor air quality during fumigations and report back to us each year.

In addition, all methyl bromide fumigations must use recapture technology within 10 years.

These guidelines are aimed at giving fumigators and operators of sites where fumigations take place guidance on how to implement the new rules. The guidance should also ensure that consistent practices are adopted across the country and that reports are provided in a standard format that can be readily understood by the public.

The guidelines are not intended to replace the formal decision made by the Authority, but offer guidance to users on how to follow the rules.

Further guidance on fumigations can be found in the Pest Management Association of New Zealand (PMANZ), Code of Practice, the Control and Safe Use of Fumigants.

Following these guidelines should ensure the health and safety of workers and the public and provide assurance that the desired safety outcomes are being achieved.

Rob Forlong

Chief Executive, ERMA New Zealand

April 2011

Background

The purpose of this document is to provide guidance on the new controls for carrying out methyl bromide space fumigations (fumigations in containers, ship holds and under tarpaulin) in relation to:

- Air quality monitoring and comparison to Tolerable Exposure Limits (TELEs);
- Buffer zones;
- Notification of fumigations;
- Reporting of exceedances of TELEs; and
- Annual reports.

This guidance has been developed following the reassessment of the use of methyl bromide by the Authority and the new controls which come into effect on 1 May 2011. These controls have been set under the Hazardous Substances and New Organisms (HSNO) Act, 1996.

This document does not replace the full decision document and controls, which can be viewed on the EPA website,

Decision document:

http://www.epa.govt.nz/search-databases/HSNO%20Application%20Register%20Documents/HRC08002_Methyl%20Bromide%20decision.pdf

Controls document:

<http://www.epa.govt.nz/search-databases/Pages/controls-details.aspx?SubstanceID=3523&AppID=1799>.

Target audience for this guide

This guide is for use by organisations and individuals involved in planning, implementing and monitoring methyl bromide fumigations. It will also be of relevance to parties who commission fumigation operations to be undertaken on their behalf.

The guide will also inform community and interest groups of the minimum requirements imposed on methyl bromide fumigations.

Further information

For further information please contact the Hazardous Substances Information Line on 0800 376 234, or email hsinfo@epa.govt.nz.

Section 1: Air quality monitoring

What are Tolerable Exposure Limits (TELs)?

Tolerable Exposure Limits (TELs) are limits of methyl bromide in air that cannot be exceeded outside the buffer zone. They have been set to protect the public. Table 1 shows the TELs set for methyl bromide in air:

Table 1: TELs for methyl bromide in air

Averaging period	Parts per million (ppm)	Milligrams per metre cubed (mg/m ³)
TELair (annual):	0.0013	0.005
TELair (24 hour):	0.333	1.3
TELair (1 hour):	1	3.9

What is the difference between annual, one-hour and 24-hour TELs?

The **annual TEL** will protect a person who may be exposed to methyl bromide over a lifetime. The TEL is given as an annual limit to enable comparison against air monitoring results over a practical timeframe.

The **one-hour** and **24-hour TELs** are levels of methyl bromide in air that are not allowed to be exceeded over these periods. No adverse effects on health are expected in the event that the public are exposed to methyl bromide at or below the TEL over these time periods.

Where do the TELs apply?

The TELs apply anywhere beyond the buffer zone established for each methyl bromide fumigation (refer to Section 2).

A buffer zone is an area surrounding the fumigation where the public are not allowed to be present during any fumigation, including when the methyl bromide is vented to air.

What is the difference between TELs and workplace exposure standards?

TELs are limits of methyl bromide in air that cannot be exceeded to protect the public. Workplace Exposure Standards (WES) are limits on the concentration of a substance in air set for the purpose of protecting

people in a workplace from the toxic effects of the substance¹. The current WES for methyl bromide is 5 ppm (19 mg/m³), as an 8-hour average (this represents a work shift of eight hours over one day).

When must air quality monitoring be carried out, and how often?

Air quality monitoring for methyl bromide is required whenever methyl bromide is being used without recapture technology.

The monitoring must start at the beginning of every ventilation period, and last until the indicated exposure drops below 0.05 ppm for either **three minutes**, for fumigations involving less than 7 kg, or **15 minutes** for those involving 7 kg or more of methyl bromide. Monitoring is required only during the ventilation period, however monitoring should be carried out during the fumigation to ensure that the fumigant is not leaking.

Monitoring should be carried out using internationally accepted sampling procedures, and by persons trained in these procedures. This must include appropriate quality assurance and quality control measures.

Who is responsible for carrying out air quality monitoring?

The person who is using methyl bromide is responsible for carrying out air quality monitoring.

Where should air quality monitoring be carried out?

Monitoring must be carried out at the point on the buffer zone boundary where the highest methyl bromide concentrations are likely to occur. Normally, this would be directly downwind from the fumigation activity.

Monitoring in the downwind direction will not be practical for some port-based fumigations when the wind is blowing offshore. In this situation, the monitoring must be done at one or more landward sites, at the edge of the buffer zone, that are judged as having the greatest potential for methyl bromide exposure to occur.

If the wind conditions are light and variable, a smoke generator or similar device should be used before the start of the ventilation period to determine the most likely downwind direction.

The monitoring site should **not** be changed if the wind direction changes significantly (say by more than 30 degrees) part way through the ventilation period. This is because fluctuations in wind direction are a normal factor in determining the potential exposures that individuals may experience in any off-site location.

In other words, monitoring should reasonably reflect “real-life”, and members of the public are unlikely to deliberately move so as to remain in the worst-case downwind location.

¹ Workplace Exposure Standards and Biological Exposure Indices; Effective 2010. Department of Labour, Wellington, September 2010 (or any subsequent updates).

However, if the wind direction changes, this information should be recorded and explained in the annual monitoring report, if one is required for the site.

The only exception to the above would be if the ventilation process is suspended for a significant period of time (e.g. where ventilation is not allowed during normal working hours).

In this situation, the operation should be regarded as two distinct ventilation periods and the monitoring should be designed and reported as two separate exercises.

This means different monitoring sites would be used if the wind direction was markedly different for the two ventilation periods.

In theory, only one monitoring site is needed to demonstrate compliance with the TEL. However, the use of a single site relies on being able to show that the chosen site is truly indicative of the maximum possible exposure levels beyond the buffer zone. Monitoring should also be considered for any nearby locations that could be regarded as more sensitive than the site directly downwind – for example, residential or business areas. This monitoring should be additional to the monitoring at the downwind location.

As a rule, a minimum of three downwind sites should be used when monitoring is first undertaken at a fumigation site. This is based on having one designated 'optimum' or 'worst-case' site, and the other two located on either side for a variation in wind direction of plus or minus 45 degrees. Alternatively, one of the two outlier monitors could be positioned in the direction of the nearest sensitive location. The results from each monitoring site should then be separately compared to the one-hour and 24-hour TELs (e.g. the air concentrations measured should not be averaged across the monitoring sites used).

The number of monitoring sites should be reduced only after the accumulated data shows that (a) the monitoring personnel have a good track record for identifying the optimum downwind sites, and (b) the measured gas concentrations are being consistently maintained below the TEL limits.

Any decision to reduce the number of monitoring sites should be made only on the basis of a recommendation by a person suitably qualified and experienced in designing and implementing an air quality monitoring programme and interpreting monitoring data.

Can one instrument be used for monitoring multiple sites?

Practical considerations would dictate that separate instruments should be used for each monitoring site. These include the requirement under the controls to record methyl bromide exposures every three minutes at each monitoring site, the time required to achieve a stable concentration measurement at each monitoring site, the personnel demands that would be associated with constantly relocating the instruments, and the data processing and analysis complications caused by changing positions.

What other factors should be considered when selecting monitoring sites?

The potential effects of nearby valley situations or marked changes in terrain should be taken into account when determining the optimum downwind direction. In particular, consideration should be given to whether the air flow is likely to be channelled in a specific direction away from the site.

The presence of buildings, trees and walls can affect airflows around the monitoring site. In addition, a free flow of air around the monitor is necessary to ensure representative sampling. For this reason, sampling in a stagnant or sheltered micro-environment should be avoided.

Specific recommendations on separation distances between monitoring sites and nearby buildings, trees and walls are given in an Australia/New Zealand Standard².

One of the instruments most commonly used for methyl bromide monitoring – the photo-ionisation detector (PID) – also responds to a range of other volatile organic compounds (VOCs). Therefore, the presence of other potential sources of VOCs in the vicinity of the monitoring site should be avoided whenever possible. If this can't be avoided, the nature of the activities and the potential for interference should be noted in the monitoring records.

How long should monitoring continue?

Monitoring must extend from the start of the ventilation period and continue until the indicated exposure remains below 0.05 ppm for either **three minutes**, for fumigations involving less than 7 kg, or for **15 minutes** for those involving 7 kg or more of methyl bromide.

When monitoring is first carried out at a fumigation site, it would be preferable for the measurements to be continued for much longer than the minimum times indicated, to ensure that the initial reduction of the indicated exposure to less than 0.05 ppm is not just part of the fluctuations that are often observed with atmospheric monitoring.

Monitoring should begin a few minutes prior to the start of the ventilation period, to allow checks on instrument stability and the potential for interferences from other VOCs.

Monitoring for compliance with the TELs requires the concentrations of methyl bromide measured to be averaged over periods of 60 minutes, 24 hours and a year. However, this does not mean that the monitoring has to run continuously over any of those time periods.

The requirement to monitor all fumigations, and to continue monitoring for some time after the indicated exposure drops below 0.05 ppm, means it is reasonable to assume that the methyl bromide concentrations can be taken as zero at all other non-monitored times.

² Australia/New Zealand Standard AS/NZS 3580.1.1:2007. Method for sampling and analysis of ambient air, Part 1.1: Guide to siting air monitoring equipment.

How do I know when the indicated exposure is below 0.05 ppm?

The instruments commonly used for methyl bromide monitoring usually only indicate methyl bromide concentrations in units of 0.1 ppm. The point at which the concentration can be taken as less than 0.05 ppm is when the reading drops from 0.1 to 0.0 ppm.

Other guidance on air quality monitoring

An industry guidance document for methyl bromide monitoring at ports has been prepared by Stakeholders in Methyl Bromide Reduction (STIMBR)³. This document was prepared before the reassessment and some of the details regarding gas concentration limits (TELs) and compliance monitoring requirements are out of date. However, the document provides a range of useful advice on monitoring methods and strategies.

Guidance on a range of other broader aspects of air monitoring is given in a Good Practice Guide published by the Ministry for the Environment (MfE)⁴. The sections on monitor siting, meteorological monitoring, quality assurance and data management and processing will all be relevant to methyl bromide monitoring.

How should the monitored concentrations be compared to the TELs?

Monitoring for fumigations involving less than 7 kg of methyl bromide

Fumigations using less than 7 kg of methyl bromide will typically be associated with containers. Monitoring will involve taking measurements either at three-minute intervals, or as three-minute average measurements, at one or more monitoring sites at the edge of the 10-metre buffer zone and immediately downwind of the container opening. The testing period would be typically about 15 to 30 minutes and is unlikely to extend beyond one hour. The data should be recorded and analysed separately for each test position.

Table 2 shows a hypothetical set of results for a single monitoring site downwind of a container. The air concentrations are arbitrary and should not be taken as indicators of the concentrations in a real-life situation.

Table 2: A hypothetical set of monitoring results for a monitoring site downwind of a container

Time	Mebr (ppm)	Comments
0800	0.0	Background check
0803	1.2	Ventilation starts at 0803
0806	2.6	

³ Methyl Bromide – Ambient Air Monitoring Protocol. Final versions V1.0, (19 June 2009). Sinclair Knight Merz, Wellington.

⁴ Good practice guide for air quality monitoring and data management. Ministry for the Environment, Wellington, 2009

0809	1.9	
0812	0.9	
0815	0.3	
0818	0.1	
0821	0.0	
0824	0.0	Readings below 0.05
0827	0.0	Stop monitoring any time after 0824, which is 3 minutes after the readings drop below 0.05 ppm
0830	0.0	
1-hr average	$(1.2 + 2.6 + 1.9 + 0.9 + 0.3 + 0.1)$ divided by 20 = 0.35 ppm	Assume readings are zero for the remainder of the hour

As shown, the one-hour average concentration is determined by adding all the measured concentrations above 0.05 ppm for the monitoring site, and dividing by 20 (based on measurements at three-minute intervals). The one-hour result for each of the monitoring sites is compared against the one-hour TEL.

The monitoring results must also be compared against the 24-hour TEL, although this is only likely to be significant if a number of container fumigations are carried out on the same day on the same site. The comparison is done by adding up the hourly average results for each monitoring site, and dividing by 24 (assuming zero gas concentrations for all non-fumigation hours).

Monitoring for fumigations involving 7kg or more of methyl bromide

Fumigation using less than 7 kg of methyl bromide will typically be associated with fumigation under sheets and in ship holds. This can also be done by taking spot measurements either at three-minute intervals, or as three-minute average measurements using continuous monitoring. The latter approach is preferred because of the much longer times required for ventilation (compared to a single container). When continuous monitoring instruments are used, it is recommended that the data be logged and recorded as one-minute averages (even though the controls only require the exposure levels to be recorded at three-minute intervals). The shorter averaging time will give more useful time distribution in the data and will assist in developing a better understanding of the gas release rates. If electronic data logging is not available, spot readings must be recorded manually at three-minute intervals.

Table 3 shows a hypothetical set of results for a single monitoring site downwind of a ship ventilation. It has been assumed that most of the gas release occurs within the first hour. It has also been assumed that there are four holds being opened in a staged process, with the more distant holds being further upwind of the

monitor (hence having less of an impact). The air concentrations should not be taken as indicative of any real-life situation.

Table 3: Hypothetical monitoring results for a single monitoring site downwind of a ship ventilation

Time	Mebr (ppm) 1 minute average	Mebr (ppm) 1 hour average	Comments
0800	0.0	-	Background check
0802	0.0	-	
0803	0.0	-	
0804	0.0	-	
0805	0.3	-	Ventilation of hold 1
0806	1.2	-	
0807	3.5		
0808	8.2	-	
0809	6.1	-	
0810	5.4	-	
0811	3.7	-	
Readings continue to fluctuate over the next hour as each hold is opened (Note: hourly averages are not calculated for the first 59 minutes)			
0903	0.8	-	
0904	1.2	A1	Hourly averages calculated at 1- minute intervals starting 60 minutes after first ventilation
0905	0.8	A2	
0906	0.4	A3	
0907	0.3	A4	
Readings continue to fluctuate but gradually decline as the ventilation process continues			
0944	0.1	A41	
0945	0.0	A42	Readings drop below 0.05
Readings remain below 0.05 ppm			
1000	0.0	A57	Stop monitoring any time after 1000, which is 15 minutes after the readings drop below 0.05 ppm
1001	0.0	A58	
1002	0.0	A59	

The entries shown as A1, A2, A3, etc, in the one-hour average column are the results obtained by calculating the average of the previous 60 one-minute average results. The one-hour average is updated at one-minute intervals (e.g. A1 = the average of results for 0805 to 0904, A2 = the average of results for 0806 to 0905, A3 = the average of results for 0807 to 0906, and so on). These are referred to as one-hour running averages.

The one-hour running average results should be assessed against the one-hour TEL and the maximum one-hour running average is the result that should be reported for each monitoring site (see later notes on reporting). A graph illustrating the concept of a running hourly averages is given in figure 1.

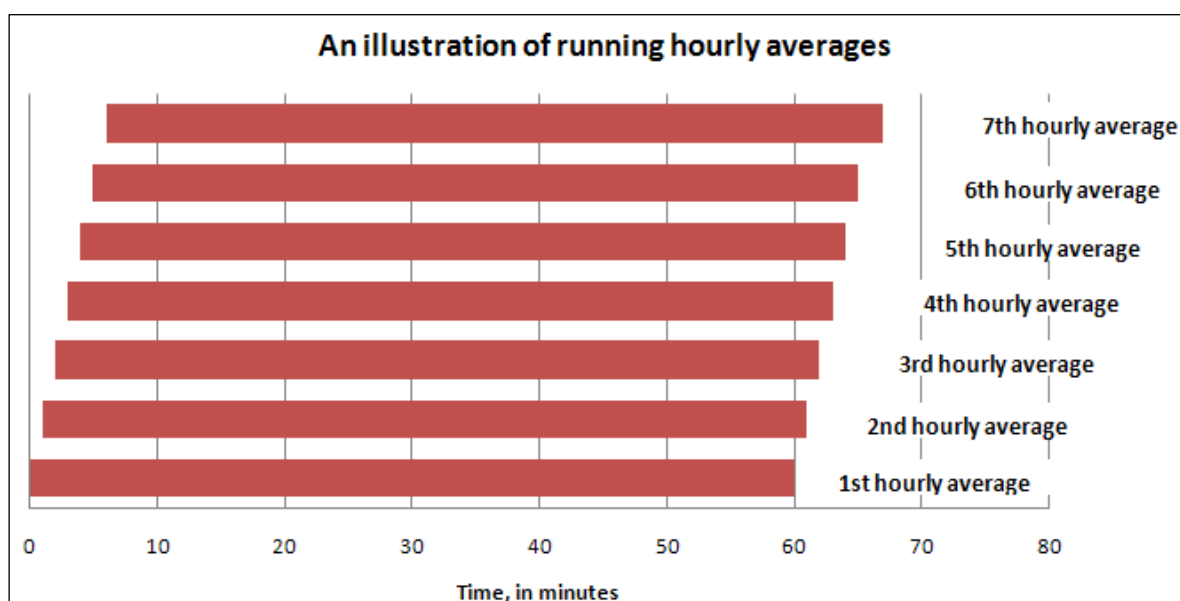


Figure 1: An illustration of the time periods used for determining hourly running averages

If the ventilation period is much shorter than the example given above (e.g, for several piles of logs under tarpaulins), the time taken for the indicated methyl bromide concentrations to drop below 0.05 ppm, and remain there for 15 minutes, may be less than one hour.

In this case, there will be only a single one-hour average result, which would be calculated by adding up all of the available one-minute results and dividing by 60. This one-hour average would be assessed against the one-hour TEL for each monitoring site.

Comparison against the 24-hour TEL

If the monitoring results for a single fumigation operation cover less than 24 hours, then the 24-hour average is determined by assuming that the methyl bromide concentration was zero for all non-monitored parts of a 24-hour period. (Note: the period does not have to be fixed; e.g. midnight to midnight, and should be taken simply as the 24 hours from the start of the ventilation period).

The 24-hour average for each monitoring site can be calculated in either of the following ways:

- By adding up all one-minute average results for the monitoring site and dividing by 1440 (the number of minutes in 24 hours); or
- By adding up all one-hour average results (fixed, not running) for the monitoring site and dividing by 24.

If the monitoring results for a single monitoring site extend over more than 24 hours, the 24-hour average values should be determined on a running hourly average basis. This is done by calculating the average result for each fixed one-hour period, and then calculating the average results for each consecutive period of 24 hours.

For example, if the ventilation period starts at 1835 on the first day, and extends through to 2052 on the next day, the hourly and 24-hourly running averages would be calculated as follows:

- hourly average periods: 1835-1934, 1935-2034, 2035-2134 and so on, through to 2035-2134.
- 24-hour average periods: 1835 on day 1 to 1834 on day 2, 1935 on day 1 to 1934 on day 2, 2035 on day 1 to 2034 on day 2 and 2135 on day 1 to 2134 on day 2.

The maximum 24-hour average result for the full monitoring period for each monitoring site should be compared against the 24-hour TEL.

Should the results from different monitoring sites be combined when calculating one-hour or 24-hour averages?

The results from different monitoring sites should not be combined when calculating either one-hour or 24-hour averages and the air concentrations measured at each site should be assessed separately against the one-hour and the 24-hour TEL.

The TELs are not to be exceeded anywhere outside the buffer zone, which means that the monitoring should record air concentrations at specific sites, rather than the average air concentrations across multiple monitoring sites. Any averaging of data from different monitoring sites would have the effect of disguising the highest air concentrations.

How should the results be compared against the annual average (chronic) TEL?

An annual average concentration for any one monitoring site can be calculated by adding up all of the maximum 24-hour average results at that monitoring site and dividing by 365. This assumes that the methyl bromide concentration was zero for all non-monitored periods.

It is recommended that the first estimates of annual average concentrations be carried out six months after the start of monitoring (with the calculations based on a six-month average, rather than 12 months).

These estimates should then be updated at monthly intervals thereafter; i.e., seven, eight, nine, 10, 11 and 12-month averages. This approach is intended to provide an early warning of any potential for exceedances of the annual average TEL, so that remedial actions can be taken as soon as possible.

The annual average calculations should then be updated at monthly intervals (effectively as a running annual average) after the first 12 months of monitoring.

Should the results from different monitoring sites be combined when calculating annual averages?

In principle, the results from different monitoring sites should not be combined when calculating annual averages and the exposure levels measured at each site should be assessed separately against the annual TEL. However, it is acknowledged that rigid adherence to this principle could result in having to calculate a significant number of separate annual average results, even when some of the monitoring sites may be within a few metres of each other. From a practical perspective, averaging the results for nearby monitoring sites across a full year will be just as representative of the potential exposure of the public as assessing each site individually. Averaging across sites that are close to each other will assist in improving the accuracy of the exposure estimates, because the average calculation would be based on a greater number of individual results.

It is recommended that the results from different monitoring sites be combined when calculating annual averages, **only** when those monitoring sites are within 10 metres of each other. The data and calculations behind the annual average concentrations should be clearly outlined in the annual report if one is required for the site.

The application of this recommendation is illustrated in Figure 2, which shows a simplified example of the possible variation in monitoring sites around a single fumigation area. In this situation, the variation in monitoring sites is primarily due to variations in wind directions. However, in many real-life situations the pattern of monitoring sites may be far more complex, because of the possible variations in the position of the fumigation activities within the overall site.

The sites marked X are all within 10 metres of each other so the measured air concentrations can be combined, as are the sites marked Y. Sites marked Z must all be assessed separately.

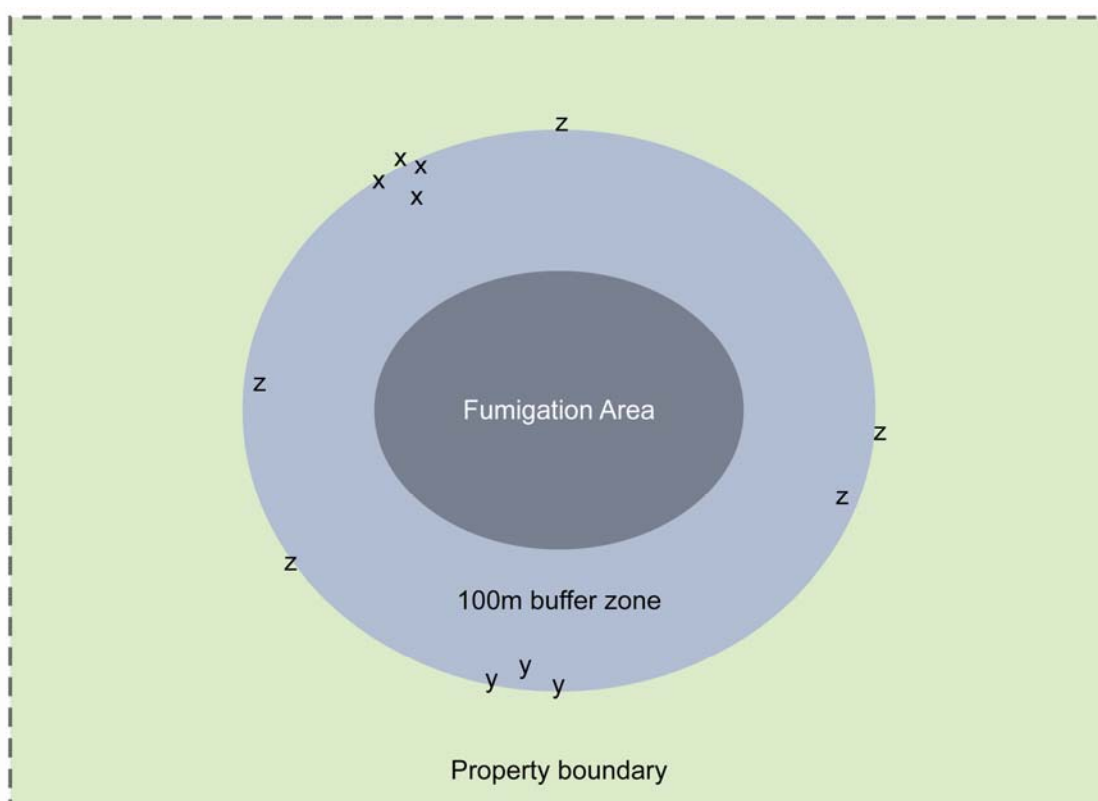


Figure 2: A simplified example of the possible variation in monitoring sites around a single fumigation area (not to scale)

How should the average concentrations be calculated and reported when there is more than one operator on a site?

There is a possibility that more than one operator will be using methyl bromide at some sites. 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 TELs, and especially the annual average value.

The person in charge of the site should be continuously and proactively calculating the 24-hour and annual average air concentrations of methyl bromide and comparing these to the TELs.

This analysis should allow people 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 the 24-hour and annual average concentrations are close to either of the TELs, they should take extra steps (such as larger buffer zones or controlled venting) to ensure that future fumigations do not result in any exceedance of the TEL.

What other data should be recorded during the monitoring?

In addition to recording the measured concentrations of methyl bromide in air, the following information must be recorded whenever monitoring is carried out:

- a. the date and time of each application and ventilation;
- b. the amount of methyl bromide applied;
- c. the location where the methyl bromide was applied and ventilated (recorded using GPS or clearly marked on a site map);
- d. wind speed and direction every three minutes at the site during ventilation;
- e. the type of enclosed space to which the methyl bromide was applied;
- f. the capacity of the enclosed space;
- g. the name of the person using methyl bromide and the physical address of their place of work;
- h. for each monitoring site, the type and location (recorded using GPS or clearly marked on a site map) of the monitoring equipment used to record the exposure levels.

Some guidance on the proper siting and operation of meteorological equipment (for recording wind speed and direction) is given in the MfE Good Practice Guide Error! Bookmark not defined..

A suitable form for recording this information is given in Appendix 1 to this document.

What notifications are required for exceedances of the TELs?

The person in charge of the site must notify the local Department of Labour office and the relevant Medical Officer of Health as soon as practicable, but within five working days if either the one-hour or 24-hour TELs for any individual monitoring site are exceeded. A standard form for this reporting is given in Appendix 2.

What happens if the ventilation is disrupted or abandoned (e.g. by tarpaulin rupture, or because of port operational restrictions)?

If ventilation has already started, the monitoring should be continued regardless of the interruption, and should be stopped only three (in the case of fumigations using less than 7 kg methyl bromide) or 15 (in the case of fumigations using more than 7 kg methyl bromide) minutes after the indicated exposure drops below 0.05 ppm, in accordance with the control requirements.

The monitoring results and all other required information should be recorded as normal, but the records should include information on the nature of the interruption and the time that it occurred.

Can the frequency of monitoring be reduced if the results are consistently low?

No. Monitoring must be carried out for all fumigations.

How long should monitoring records be kept?

The data must be kept for seven years and be available for inspection upon request by an enforcement officer.

What is the difference between the ppm and mg/m³ units used for the TELs?

The abbreviation ppm stands for parts per million and is a volumetric measurement; 1 ppm equals 1 volume of methyl bromide gas in a million volumes of air (eg. 1 litre per million litres).

The abbreviation mg/m³ stands for the weight of methyl bromide, in milligrams, in a standard cubic metre of air. To convert ppm to mg/m³ for methyl bromide multiply the ppm concentration by 3.9. The conversion between the two units is explained in some detail on pages 71 to 74 of the MfE Good Practice Guide^{Error!}

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What information should be recorded if a discharge (an unintentional release) of methyl bromide occurs?

If an unintentional release of methyl bromide occurs, the following information must be recorded:

- Date and time of the discharge
- Approximate amount of methyl bromide discharged
- Location where the discharge occurred (recorded using GPS or clearly marked on a site map)
- Approximate wind speed and wind direction during the discharge
- Reason why the discharge occurred
- Capacity of the enclosed space being fumigated
- Name and address of person using methyl bromide and the address of their place of work

If an annual monitoring report is required for the site this information must be included in the annual report (see Section 4 for further details).

Section 2: Buffer zones

What is a buffer zone?

A buffer zone is the area around the fumigation site where the public must not be present. Buffer zones ensure the public are not exposed to concentrations of methyl bromide exceeding the TEL.

Buffer zones extend in all directions from the point of the ventilation, including over water.

Are workers allowed to be present in the buffer zone?

Yes. The health of workers is protected by the requirements to comply with Workplace Exposure Standards (WES). Workers are not just those who are involved in the fumigation, but include all people employed to work at the site, for example, office workers or cargo handlers.

When are buffer zones required?

Buffer zones are required for all fumigations using methyl bromide where recapture technology is not being used.

Buffer zones are required from the time fumigation begins until such time as the air quality monitoring (as outlined in Section 1) shows that the concentration of methyl bromide in air is less than 0.05 ppm.

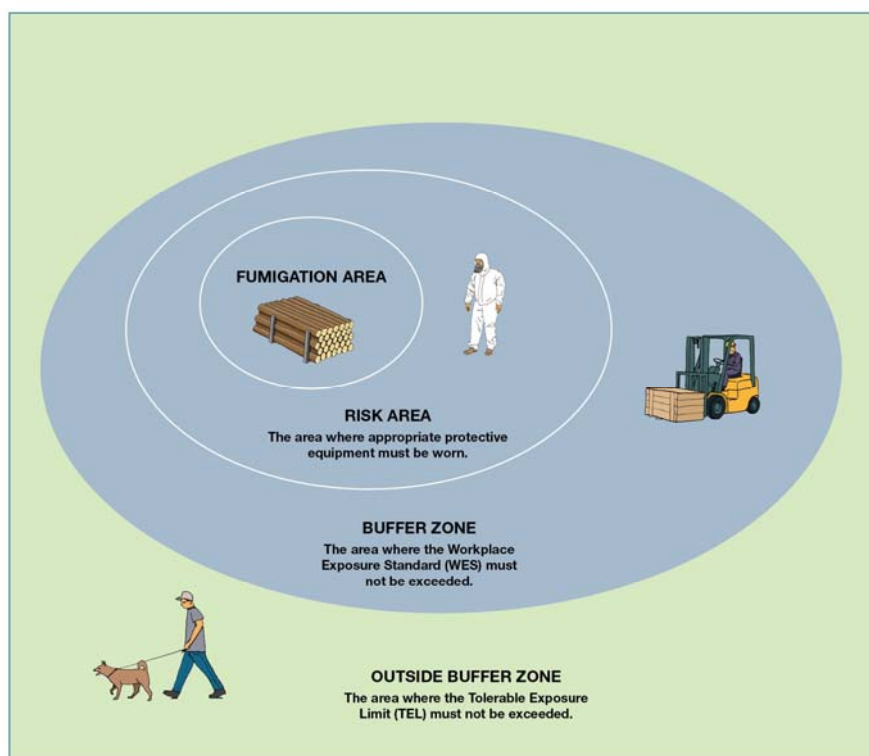


Figure 3: An illustration of where the TEL and WES values apply

What size buffer zones apply to what fumigations?

The size of the buffer zone depends on the quantity of methyl bromide used and the way in which it is used. Table 4 indicates the minimum buffer zones that must be in place around all fumigations where recapture technology is not used. The person in charge of the site is responsible for ensuring that these buffer zones exist.

Table 4: Buffer zones for methyl bromide fumigations not using recapture technology

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

* 77 m³ is the size of a standard shipping container

If I am fumigating two or more containers in an hour at a site and the containers are not close to each other what size buffer zone needs to exist around each container?

If the total volume of the containers being fumigated exceeds 77 m³ the buffer zone must be 25 metres around each container. This is to avoid the possibility of cumulative effects happening at the same site.

How do the public know that a buffer zone exists?

The person in charge of the site must ensure that the public are not in the buffer zone.

The person using methyl bromide must put signs at any point of access to the buffer zone accessible to the public, (for example at any location where a pedestrian or vehicle could enter the buffer zone), warning the public that methyl bromide is being used. If the fumigation takes place during the hours of darkness, the signs must be illuminated. An example of such a sign is shown in Figure 4.







<p style="text-align: center;">FUMIGATION TAKING PLACE</p> <p style="text-align: center;"></p> <p style="text-align: center;">FUMIGANT: METHYL BROMIDE</p>	<div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%; text-align: center;"></div> <div style="width: 50%; text-align: center;"></div> <div style="width: 50%; text-align: center;"></div> <div style="width: 50%; text-align: center;"></div> <div style="width: 100%; text-align: center;"></div> </div>
<p>CONTACT: FUMIGATOR: PHONE: PERSON IN CHARGE: PHONE:</p>	
<p>Date of Fumigation: / / In an emergency Dial 111 Fire Brigade</p>	
<p style="text-align: center;">NO SMOKING; NO NAKED FLAMES; NO IGNITION SOURCE</p>	

Figure 4: An example of a sign for methyl bromide fumigations

How can the public be kept out of the buffer zone if it exists over water?

There should be a sign either on the vessel or at another appropriate location informing the public that fumigation is taking place and that they must keep away from the fumigation site. This sign must be visible to those approaching the buffer zone from the seaward direction. If fumigation takes place during the hours of darkness, the sign must be illuminated.

The person using methyl bromide should also take additional measures where possible including communicating beforehand with local people who may be boat users and using prearranged flags and/or flashing lights to warn people that fumigation is taking place.

During the fumigation, the seaward side of the buffer zone must be continually watched. If a person or a vessel enters the buffer zone, all practical steps must be taken by the person in charge of the site to get them to leave the buffer zone as soon as possible. Examples of how this might be done include communication via a VHF radio or loud speakers.

What buffer zones exist around sensitive sites?

No fumigation using methyl bromide (including those where recapture technology is used) can take place within 25 metres of a sensitive site.

Sensitive sites are locations where members of the public who cannot be easily evacuated during an accident may be present. These include schools, hospitals, prisons and long-term care residential facilities. Because an accident could possibly occur during any type of fumigation, the 25-metre buffer zone around a site also applies to all fumigations, including fumigations that use recapture technology.

Can larger buffer zones be used?

Yes. The buffer zones in Table 4 are the minimum distances to be used. Ideally, fumigations should be carried out as far as possible from where the public may be present.

The minimum buffer zone represents the distance at which the public are unlikely to be exposed to concentrations of methyl bromide exceeding the TELs. However, if air quality monitoring shows a TEL is being exceeded, the person using methyl bromide and the person in charge of the site will need to adopt a larger buffer zone to avoid any further breaches of the TEL.

Exceeding a TEL while complying with the minimum buffer zones is a breach of the HSNO controls.

Would the edge of the buffer zones always be at the site perimeter?

Not necessarily. The edge of the buffer zone may be anywhere provided the person in charge of the site can ensure that the public are kept out of the buffer zone. However, in practice, the edge of the buffer zone is likely to be at the site perimeter.

At large sites, other means can be used to prevent entry, such as temporary fencing and barriers.

Can regional and unitary councils or port authorities set larger buffer zones and/or additional controls on fumigations involving methyl bromide?

Yes. Regional and unitary councils can set more stringent controls under the Resource Management Act (RMA), including larger buffer zones if they deem them necessary because of local conditions. Port authorities may also set more stringent requirements as part of allowing fumigation activities to occur on a port site. The HSNO controls are the minimum standards that must be achieved.

Can smaller buffer zones be used?

Smaller buffer zones can be used only if the person using methyl bromide develops a code of practice to demonstrate that alternative measures (for example, by carrying out staged ventilating of ships holds) would ensure that no TEL would be exceeded with the smaller buffer zones. The EPA would have to approve the code of practice.

Section 3: Notification of fumigations

The notification requirements when using methyl bromide for space fumigation have changed.

Depending on the type of fumigation, the person using methyl bromide must inform the following people at least 24 hours before the fumigation begins.

Table 5: Notification requirements for methyl bromide

Type of application	Relevant people to be notified
Ship's hold	The nearest communications centre of the New Zealand Fire Service; and Person in charge of the site.
Sheets	The nearest communications centre of the New Zealand Fire Service; and Person in charge of the site.
Container	Person in charge of the site.
In addition to above, where fumigations use less than 100 kg of methyl bromide for space fumigation	Neighbouring property owners and occupants, within 25 metres of the site, where recapture technology is not being used.
In addition to above, where fumigations use more than 100 kg of methyl bromide for space fumigation	Neighbouring property owners and occupants, including moored boats, within 100 metres of the site, where recapture technology is not being used.

Who is responsible for notification?

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

What is required?

Notification of a fumigation should be made:

- in writing;
- at least 24 hours before the start of the fumigation.

If there is a public health or biosecurity emergency, how much prior notice must be given?

If there is an immediate risk to public health and biosecurity, the notification period can be less than 24 hours.

What happens at the end of the fumigation?

Once the fumigation is over and the air quality monitoring required in Section 1 is complete, all persons who have been notified of the fumigation must be informed that the fumigation is finished. Advising that a fumigation is over does not have to be done in writing (it could, for example, be done by phone or email).

What about regular, frequent fumigations?

Where a fumigation company or site is involved in regular, weekly fumigations, an annual written notification to the people identified in Table 5 may be made as an alternative to notification of individual fumigations.

Annual notification must identify:

- where the fumigations will take place (this should be specific enough to allow the location to be easily located);
- the time at which ventilation usually occurs;
- the expected frequency of fumigations, (for example: daily, four times a week, etc); and
- any likely seasonal trends, such as fumigations at particular times of the year for specific purposes.

A template notification letter and record sheet are included in Appendices 3 and 4

Section 4: Annual reports

Annual reports of air quality monitoring

When is an annual monitoring report required?

An annual monitoring report must be provided if **500 kilograms or more** of methyl bromide is applied in a **calendar year** at a site without recapture technology.

Who is responsible for submitting the report?

The person in charge of a site is responsible for providing the annual monitoring report.

What if recapture technology is used?

An annual monitoring report is not required for methyl bromide fumigations that use recapture technology.

What should the monitoring report contain?

The report must contain the following information for the entire site where fumigations occurred:

- the number of methyl bromide fumigations carried out at the site;
- the total amount of methyl bromide applied at the site;
- the types of enclosed spaces to which methyl bromide has been applied;
- the types of equipment used to carry out the monitoring of methyl bromide air concentrations;
- the annual average air concentration of methyl bromide for each monitoring site (data for several monitoring sites can be combined only if these sites are close to each other as per Figure 2). This should include the calculation used to estimate this value.
- the approximate total amount of methyl bromide accidentally discharged;
- how many times the air concentration of methyl bromide exceeded any TEL and where these exceedances occurred;
- any significant changes in wind direction (for example, greater than 30 degrees) that occurred during the ventilation period;
- the number of times that the local Medical Officer of Health and the Department of Labour have been notified about any exceedance of a TEL;
- if a breach of the TEL has occurred, an outline of what risk mitigation measures have been or are being put in place to prevent such an event occurring in the future; and
- any accidents or other issues relating to non-compliance with any of the HSNO controls.

If a site has more than one area where fumigation are undertaken (e.g. logs in one area and containers in another area) only one report is required for the entire site. An sample report is given in Appendix 5.

Who do the reports go to?

Annual monitoring reports must be submitted to the EPA, the local Department of Labour office and the relevant Medical Officer of Health. Reports for the EPA should be sent to:

The General Manager Hazardous Substances
EPA
PO Box 131
Wellington 6140

What is the timeframe?

The report is to be based on a calendar year (1 January to 31 December) and must be submitted by 30 June the following year. The first report is due on 30 June 2012, and will record activities from 1 May 2011 to 31 December 2011.

What happens to the reports once they are submitted?

All annual monitoring reports will be published on the EPA website.

Annual report outlining progress towards introducing recapture technology

What is required?

This annual report is a separate requirement to the annual monitoring report and is intended to report on the progress made on introducing recapture technology. The report should also include information about alternative methods of treatment that could be used to reduce the use of methyl bromide.

Can more than one fumigator submit a joint report?

Yes. An industry body or any other party may submit a joint report on behalf of several fumigators.

When must this report be submitted?

This report must be submitted to the EPA (at the address above) by 30 June every year. The first report must be submitted by 30 June 2012.

Appendix 1: Example of how to record methyl bromide air monitoring information

(This cover sheet should be on letterhead paper that shows the name and address of the company or other entity carrying out the monitoring. As most monitoring data will be recorded electronically, it is recommended that the Page 1 sheet (below) be used as a cover sheet with the printouts of the monitoring data attached.)

Page 1 cover sheet

Fumigation site: (Insert the name of the site on which fumigation is being carried out; e.g., Port of Marlborough, Picton, or Jones' Shipping Company, freight depot, Newtown, Wellington)		
Date: (Record the date on which you start to record this information, which should be immediately prior to the start of monitoring)	Location: (Record the specific location of the fumigation operation within the site, using an attached site plan, if necessary, to clarify)	
Name and address of the person using methyl bromide: (Record the person's name, company name, and physical address of their normal place of work)		
Name and position of the person carrying out the monitoring: (Your name and position)		
Type of enclosed space: (eg. ship's hold, logs or shipping container)	Capacity of the space: (Record the volume in litres or cubic metres)	Quantity of methyl bromide used: (Record the quantity in kilograms)
Fumigation start date & time:		Operational observations: (Record any information relevant to the gas release; eg. Ship's hold cover jammed part open, tarpaulin snagged)
Ventilation		
Start date/time:		
Finish date/time:		
Monitoring equipment and monitoring site details		
Site 1: (Identify the site using a numbering system or with meaningful names, which should also be used on the site plan below. Also record the type of equipment used at each site. Add more site numbers if necessary)		
Site 2:		
Site 3:		
Meteorological Monitor: (Record site details and equipment type)		
Site Plan (Attach a site plan showing the layout of the fumigation activity and the position of each of the monitoring sites, including the meteorological equipment. Also indicate the directional relationships, e.g. by adding an arrow pointing to the North. The site plan should carry the name of the fumigation site as given on the coversheet.)		

Page 2a (Data Sheet for Continuous Instrumental Monitoring)

When electronic data logging is used, the layout and content of the monitoring data may be determined by the data processing software. The following indicates the minimum data presentation required. This would be achieved either by using the reporting options in the software, or by transferring the data into a text processor or spreadsheet file.

The required recording interval for wind speed and direction is once every three minutes, although that should not preclude more frequent recording.

Start date and time: (start date and time for the monitoring record)						
Time	Wind speed, m/s	Wind dirn (deg)	MeBr, Site 1		MeBr, Site 2	
			1-min average, ppm	Running hourly average, ppm	1-min average, ppm	Running hourly average, ppm
0825	1.7	213	0.00			
0826			0.00			
0827			0.00			
0828	1.9	208	0.23			
0829			1.35			
0830			3.24			
0831	1.6	209	4.71			
etc			3.98			
			3.12			
			1.84			
			0.91			
			etc			
				The running hourly average records starts after 60 minutes		
Maximum hourly average			Site 1:	x.x ppm	Site 2:	y.y ppm
Maximum 24 hour average			Site 1:		Site 2:	

Page 2b (Data sheet for recording spot measurements)

Start date and time: (start date and time for the monitoring record)						
Time	Wind speed, m/s	Wind dirn (deg)	MeBr, Site 1		MeBr, Site 2	
			3-min results, ppm	Running hourly average, ppm	3-min results, ppm	Running hourly average, ppm
(The numbers shown below are purely for illustrative purposes)						
0825	1.7	213	0.00			
0828			0.00			
0831			0.00			
0834	1.9	208	0.23			
0837			1.35			
0840			3.24			
0843	1.6	209	4.71			
etc			3.98			
			3.12			
			1.84	The running hourly average records starts after 60 minutes		
			0.91			
			etc			
Maximum Hourly average			Site 1:	x.x ppm		
Maximum 24 hour average			Site 1:			

Appendix 2: Example of how to report TEL exceedances

To: Department of Labour	Attn:	Fax Number:
To: Medical Officer of Health	Attn:	Fax Number:
Date		

Notification of exceeding exposure level of the Tolerable Exposure Level (TEL_{air}) value for methyl bromide

This form is for use by the person in charge of a site undertaking fumigation (other than soil fumigation) using methyl bromide when an exceedance of a TEL has occurred. The HSNO controls require that the person in charge of the site must notify Department of Labour and the relevant Medical Officer of Health as soon as practicable, but within 5 working days, if at any monitoring site either the 1 or 24 hour average concentrations exceed the 1 or 24 hour TELs. (Reference: HRC08002-Methyl-Bromide-decision – Appendix C: Controls – Table C2 clause 3)

(<http://www.epa.govt.nz/Documents/HRC08002-Methyl-Bromide-decision.pdf>)

Contact details

Company name:	Address:
Name of person in charge: (at time of exceedence)	Contact phone number:

Description of exceedence

Indicate the type of TEL value which has been exceeded:	HSNO Requirement Tolerable Exposure Limits (air)	Concentration of methyl bromide recorded in air	Date	Time	Wind direction ⁵	Wind speed
1 hour	1 ppm 3.9 mg/m ³					
24 hours	0.0013 ppm 1.3 mg/m ³					

⁵ If meteorological information is continuously being recorded at the site attach a print out of these data to this form. If not provide the wind direction and wind speed data for the time periods when the TEL was breached.

Additional information

Location where the exceedance occurred and distance of buffer zone

(include New Zealand Mapping Series grid reference/GPS or a map showing the location of the fumigation):

Details of the fumigation that caused the exceedance

(for example, fumigation of logs in a ships hold)

Possible reason(s) for the exceedance:

Actions taken to mitigate any effects at the time of exceedance

Actions taken to avoid exceedances from happening again

Appendix 3: Example of notification letter

On a company letterhead with contact details

Name of person

Address

Postcode

Date

Re: Notification of methyl bromide fumigation

Dear Occupant

We are writing to notify you of our intention to carry out a fumigation using methyl bromide at _____
_____ on _____, _____, _____ (day, month, year), between the hours of _____ and _____. We will
contact you again to inform you when the fumigation is complete.

Please contact us [provide a contact phone number or email address] if you require any further information.

Yours sincerely

(signature)

Name

Appendix 4: Example of notification record sheet

Name of person who conducted notification	
Organisation	
Date and time of notice	
Method of notification	<input type="checkbox"/> Letter <input type="checkbox"/> Fax <input type="checkbox"/> Email
Contact details of person notified	
Reason for notifying the person	<input type="checkbox"/> Recapture not used, occupant within 25 metres of fumigation site. <input type="checkbox"/> Recapture not used, occupant within 100 metres of fumigation site, more than 100 kilograms of methyl bromide to be used.
Notification type	<input type="checkbox"/> Letter of notification at least 24 hours before start of fumigation. <input type="checkbox"/> Letter of notification of frequent, weekly fumigations.
Did the person acknowledge the notification?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Did they raise any operational issues?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Notification of end of fumigation?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Method of notification?	<input type="checkbox"/> Letter <input type="checkbox"/> Fax <input type="checkbox"/> Email
Comments	
Details of person filling in this sheet	Name:
	Signature:
	Date:

Appendix 5: Example of draft annual monitoring report

(Every person in charge of a site using over 500 kg/year of methyl bromide (not including any methyl bromide that is recaptured), is required to prepare an annual report of their air quality monitoring. The information shown below is the minimum data that must be recorded in an annual monitoring report. The report must show the name and address of the reporting company or other entity and could be on company letter headed paper.)

Fumigation site name and/or description:

(eg, Jones' Shipping Company, freight handling depot, 21 Smith St, Newtown, Wellington)

Period covered by this report:

(must cover a calendar year, 01 January to 31 December)

Report prepared by:

(name and position)

Report checked by:

(name and position)

Number and type of fumigations carried out in the year:

(use the following tabular summary)

Type of contained space fumigated	Number of fumigations	Total amount of MeBr used
(eg. ships holds)	x	a (kg or tonnes)
(eg. logs under tarps)	y	b (kg or tonnes)
(eg. 20 ft shipping containers)	z	c (kg or tonnes)
Totals	(x + y + z)	a + b + c

Number of Monitoring Sites and Monitoring Equipment Used:

(Summarise the general approach used for monitoring of each fumigation in terms of the numbers of monitoring sites normally used for each type of fumigation and the general spatial distribution and location of the monitoring sites. Also, provide specific details for the types of monitoring equipment used, and the type and location of the meteorological monitoring equipment. Illustrate the typical layout for monitoring with an attached site plan, if this will help to provide additional clarity.)

Monitoring Results:

(attach a tabular summary of all monitoring results for the year, broken down by monitoring site and fumigation type)

Annual Methyl Bromide Exposure Level(s):

(This should give the air concentrations of methyl bromide for each monitoring site. The values used and the calculation of the annual average should be included.)

Number of Notifications of Breaches of the TEL Values:

(list the number and dates of any notifications made to the Medical Officer of Health and the Department of Labour). Attach a copy of any notifications made using the forms in Appendix 2.

Discussion of Breaches of the TELs:

(for each exceedance discuss the possible causes and remedial actions taken to ensure future compliance with the TELs)

Other Compliance Matters:

(describe any accidents or other issues related to non-compliance with any of the methyl bromide controls, including an estimate of the approximate total amount of methyl bromide accidentally discharged)

Explanation of terms

Air quality monitoring	The monitoring of the methyl bromide concentrations in air at the edge of the buffer zone.
Buffer zone	The area around a fumigation outside of which the Tolerable Exposure Level (TEL) must not be exceeded.
Calendar year	January 1 to December 31.
Exceedance	When the monitored concentrations of methyl bromide in air at a specific location averaged over 1 hour, 24 hours or 1 year exceed the relevant TEL.
mg/m³	Milligrams per cubic metre. This is a measure of the concentration of methyl bromide in air on a mass/volume basis.
Notification	The process of informing people that methyl bromide fumigation is taking place.
PPE	Personal protective equipment
ppm	Parts per million (for methyl bromide gas, 1ppm = ~ 3.9 mg/m ³)
Recapture technology	A system for capturing methyl bromide so that it is not released into the atmosphere.
Risk area	The area in which appropriate personal protective equipment must be worn.
TELs	Tolerable Exposure Limits. This is the limit that must not be exceeded outside the buffer zone.
TWA WES	Time-weighted average Worker Exposure Standard. This is designed to protect workers from the effects of long-term exposure.
WES	Workplace Exposure Standard



Environmental
Protection Authority
Te Mana Rauhi Taiao

BP House, (Level 1), 20 Customhouse Quay, Wellington 6011, New Zealand

