Pacific Horticultural and Agricultural Market Access Program (PHAMA)

Technical Report 50: Implementation of the Australian Fumigation Accreditation Scheme for PHAMA Countries (REGIONAL06)

17 JUNE 2013

Prepared for

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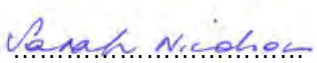
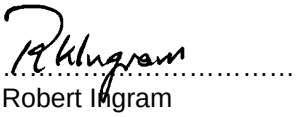
Project Manager:	 Sarah Nicolson	**URS Australia Pty Ltd** **Level 4, 70 Light Square** **Adelaide SA 5000** **Australia** **T: 61 8 8366 1000** **F: 61 8 8366 1001**
Project Director:	 Robert Ingram	
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Abbreviations

Abbreviation	Description
A$	Australian dollar
AFAS	Australian Fumigation Accreditation Scheme
AQIS	Australian Quarantine and Inspection Service
BAF	Biosecurity Authority of Fiji
DAFF	Department of Agriculture, Fisheries and Forestry (Australia)
MAFFF	Ministry of Agriculture and Food, Forests and Fisheries
PHAMA	Pacific Horticultural and Agricultural Market Access Program
PPE	Personal Protective Equipment
SIAQS	Solomon Islands Agriculture Quarantine Service
STA	PHAMA Short Term Adviser
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Executive Summary

The use of methyl bromide fumigation treatments for quarantine purposes is crucial in preventing the spread of plant pests and diseases that have significant economic and environmental consequences. Like most chemicals, methyl bromide is relatively safe to use and is effective if applied correctly; however, if applied incorrectly or without appropriate precautions, the treatment is likely to be ineffective and can potentially cause harm to people and the environment.

Methyl bromide is used extensively in Pacific Horticultural and Agricultural Market Access Program (PHAMA) countries for pre-shipment and quarantine purposes on a wide range of import and export product. Being relatively inexpensive and quick acting, it is a favoured treatment over more expensive and less readily available treatment technology.

It is recognised that fumigation treatment providers and quarantine officers in PHAMA countries generally have insufficient skills and knowledge to deliver or supervise an effective and safe methyl bromide fumigation treatment. This situation, combined with inadequate or unserviceable equipment, results in poor fumigation practices. It is therefore not unexpected that the effectiveness of the fumigation practices in PHAMA countries is questioned by trading partners. Consequently, much needed development of reliable accreditation, audit and standards for treatments (including methyl bromide) within PHAMA countries is seen as an essential component not only to develop sustainable market access but also to help protect the biosecurity interests of that country.

This activity has concentrated on capacity building of quarantine agencies and fumigation providers to improve technical expertise in methyl bromide fumigation practices and to provide quarantine officers with the skills required to effectively manage an accreditation framework and monitor and audit fumigation companies.

To date, 136 participants from the quarantine services and private sectors from Fiji, Samoa, Solomon Islands, Tonga and Vanuatu have attended the Australian Fumigation Accreditation Scheme (AFAS) training. The activity has also seen the successful transition to AFAS training being delivered within Pacific Island Countries by Biosecurity Authority of Fiji officers, which is substantially more cost-effective than using Australian-based AFAS staff to perform the training, and also importantly has built regional capacity and expertise in methyl bromide fumigation practices.

1 Introduction

Methyl bromide as a fumigant is used extensively in Pacific Horticultural and Agricultural Market Access Program (PHAMA) countries for the control of pests and diseases, particularly given that establishing facilities for alternative treatment methods such as heat treatment or cold storage is generally considered cost prohibitive. Methyl bromide is also a favoured treatment option as it is relatively inexpensive, is acutely toxic to a wide range of insect pests and diseases, and is quick acting.

Methyl bromide is also a significant ozone depleting gas and control measures have been put in place under the Montreal Protocol on the production and consumption of all ozone depleting substances, including methyl bromide. While fumigation for quarantine and pre-shipment purposes is still exempt from these controls, responsible use of methyl bromide to minimise emissions is crucial.

Not only is methyl bromide extremely toxic to the target pests, it is also toxic to non-target organisms. It can have serious effects on human health at low concentrations and inhalation of methyl bromide at high concentrations can be fatal. It is therefore critical that all precautions are taken for persons working with and around methyl bromide and that fumigation sites are situated so as to not cause harm to people or the environment.

2 Background

The vast majority of quarantine and pre-shipment methyl bromide fumigations performed in PHAMA countries are for containerised cargo. While Solomon Islands and Fiji use private treatment providers to conduct quarantine and pre-shipment methyl bromide fumigations, the quarantine services in Vanuatu, Tonga and Samoa currently use their own staff to perform the fumigation functions.

The Australian Fumigation Accreditation Scheme (AFAS) is a voluntary partnership between the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF) and a number of quarantine services and fumigators, predominantly in Papua New Guinea and South East Asia. AFAS is intended to provide capacity building assistance to overseas quarantine services, improve the technical expertise of overseas fumigators and quarantine officers, and assist fumigators to maintain a high standard of fumigation competency and compliance with DAFF requirements.

To attain full AFAS accreditation, quarantine services and fumigation service providers need to have appropriate skills and knowledge to conduct methyl bromide fumigation treatments to an agreed standard.

Initial screening conducted by AFAS staff had identified that all PHAMA countries except Fiji were currently not capable of meeting the AFAS criteria and would require training and equipment upgrades should they wish to formally apply to enter AFAS.

To develop the capacity of the quarantine services and fumigators to an agreed level of competence to perform methyl bromide fumigations, PHAMA, in consultation with AFAS, initiated a fumigation training strategy. The training strategy entailed training being conducted to the AFAS standard; however, PHAMA countries would not necessarily need to seek accreditation or be bound to the obligations associated with AFAS. It was further decided that initial fumigation training would be conducted in Fiji, as AFAS had identified that Fiji's treatment operators were at a level of competence such that AFAS country accreditation was attainable.

To also capitalise on the initial fumigation training in Fiji, a decision was made to initially use Fiji as the regional hub for additional fumigation training for other Pacific Island countries.

Following on from the initial fumigation training, a Train-the-Trainer course was conducted in July 2012 in Fiji, with the objective being to build regional capacity to deliver AFAS fumigation training without relying on Australia-based AFAS staff.

3 Scope

To develop technical expertise and reliable accreditation and audit processes for methyl bromide fumigation treatments within PHAMA countries, the planned scope of this activity included:

- Managing the provision of fumigation training for PHAMA countries, in consultation with accredited Fijian fumigation trainers and AFAS;
- Providing oversight of technical training in fumigation procedures to government officers and industry fumigators from the five PHAMA member countries;
- Providing audit and Train-the-Trainer training to government officers from the five PHAMA member countries; and
- Assisting with the development and provision of training material.

The planned deliverables for this activity were as follows:

- Management of the delivery of basic fumigation training, Train-the-Trainer and audit and verification procedures associated with fumigation;
- Revisions of PHAMA countries' fumigation manuals (if required); and
- Provision of advice on fumigation equipment and infrastructure needs on an ongoing basis.

4 Training Overview

To assist fumigation treatment providers and regulatory agencies to achieve and maintain a high level of proficiency in fumigation practices and compliance, AFAS provides the following training:

AFAS Training (Fumigation with Methyl Bromide for Quarantine Purposes)

The AFAS Methyl Bromide Training Course is delivered over five days and consists of theoretical and practical training to provide industry and government officers with the knowledge and skills necessary to perform an effective fumigation in accordance with the Australian Quarantine and Inspection Service (AQIS) Methyl Bromide Fumigation Standard.

The course outline consists of five parts: Principles of Fumigation; Performing a Fumigation; Field Training; Scenarios; and Assessments. Candidates are assessed for competency by one-on-one interviews and calculation exercises. Candidates assessed as competent are presented with an accreditation certificate.

AFAS Audit Training

The AFAS Audit Training Course is delivered over three days and consists of two modules. Module 1 (Auditing Fundamentals) provides participants with the necessary knowledge and skills to conduct an audit, and Module 2 (Auditing against the AQIS Methyl Bromide Standard) applies the knowledge and skills learnt in Module 1 to audit fumigation companies participating in AFAS.

Train-the-Trainer

The AFAS Train-the-Trainer Course is delivered over four days and consists of theory and practical training to provide participants with the skills and abilities to effectively deliver the AFAS Fumigation Training Package, conduct accreditation assessments, and evaluate the effectiveness of their training.

5 Activities Conducted

Activities supported by PHAMA have concentrated on capacity building of quarantine agencies and fumigation providers to improve technical expertise in fumigation practices and provide regulatory officers with the skills required to monitor and audit fumigation companies. Details of each input are provided below.

Input 1

AFAS Training (Fumigation with Methyl Bromide for Quarantine Purposes); Fiji 7–11 May 2012 (Canberra-based AFAS staff as trainers).

Input 2

Train-the-Trainer Course; Fiji 17–20 July 2012 (Canberra-based AFAS staff as trainers).

Input 3

AFAS Training (Fumigation with Methyl Bromide for Quarantine Purposes); Fiji 23–27 July 2012 (Biosecurity Authority of Fiji [BAF] staff as trainers under supervision of Canberra-based AFAS staff).

Input 4

AFAS Training (Fumigation with Methyl Bromide for Quarantine Purposes); Fiji 28–31 August 2012 (BAF staff as trainers).

Input 5

AFAS Training (Fumigation with Methyl Bromide for Quarantine Purposes); Fiji 10–14 September 2012 (BAF staff as trainers).

Input 6

Scoping visits to Samoa, Solomon Islands and Vanuatu to assess practices, facilities and equipment used to conduct methyl bromide fumigations treatments; September–October 2012 (AFAS and PHAMA short-term adviser [STA]).

Input 7

AFAS Training (Fumigation with Methyl Bromide for Quarantine Purposes); Fiji 11–14 November 2012 (BAF staff as trainers).

Input 8

AFAS Audit Training Course; Fiji 21–23 November 2012 (Canberra-based AFAS staff as trainers).

Input 9

AFAS Training (Fumigation with Methyl Bromide for Quarantine Purposes); Fiji 26–30 November 2012 (BAF staff as trainers under supervision of Canberra-based AFAS staff).

Input 10

Development of fumigation procedural manuals, industry accreditation and Auditor Course; Solomon Islands 10–22 March 2013 (PHAMA STA).

Input 11

AFAS Training (Fumigation with Methyl Bromide for Quarantine Purposes); Solomon Islands 15–19 April 2013 (BAF and PHAMA STA as trainers).

Input 12

Provision of ongoing advice on fumigation equipment and infrastructure needs to PHAMA countries.

6 Input Summaries

6.1 Input 1 – AFAS Training (Fumigation with Methyl Bromide for Quarantine Purposes) – Fiji

Fumigation training was conducted for 22 participants from BAF and the private sector on 7–11 May 2012 in Fiji. Canberra-based AFAS staff conducted the training.

Training resources for the AFAS Training (Fumigation with Methyl Bromide for Quarantine Purposes) are provided at Appendix A (includes 10 sub-appendices).

6.2 Input 2 – Train-the-Trainer Course – Fiji

A Train-the-Trainer Course was delivered to five BAF Officers on 17–20 July 2012 in Fiji. Canberra-based AFAS staff conducted the training.

The objective of delivering the Train-the-Trainer Course was to build regional capacity in order for BAF to deliver the AFAS fumigation training without relying on Canberra-based AFAS staff.

Training resources for the AFAS Train-the-Trainer Course are provided at Appendix B.

6.3 Input 3 – AFAS Training (Fumigation with Methyl Bromide for Quarantine Purposes) – Fiji

Fumigation training was conducted for 20 participants from BAF and the private sector on 23–27 July 2012 in Fiji. BAF staff that attended the Train-the-Trainer Course delivered the training under the supervision of Canberra-based AFAS staff.

Training resources for the AFAS Training (Fumigation with Methyl Bromide for Quarantine Purposes) are provided at Appendix A.

6.4 Input 4 – AFAS Training (Fumigation with Methyl Bromide for Quarantine Purposes) – Fiji

Fumigation training was conducted for 22 participants from BAF and the private sector on 28–31 August 2012 in Fiji. BAF staff that attended the Train-the-Trainer Course delivered the training.

Training resources for the AFAS Training (Fumigation with Methyl Bromide for Quarantine Purposes) are provided at Appendix A.

6.5 Input 5 – AFAS Training (Fumigation with Methyl Bromide for Quarantine Purposes) – Fiji

Fumigation training was conducted for 16 participants from BAF and the private sector on 10–14 September 2012 in Fiji. BAF staff that attended the Train-the-Trainer Course delivered the training.

Training resources for the AFAS Training (Fumigation with Methyl Bromide for Quarantine Purposes) are provided at Appendix A.

6.6 Input 6 – Scoping Visits to Samoa, Solomon Islands and Vanuatu

Scoping visits to Samoa, Solomon Islands and Vanuatu were undertaken in September and October 2012. The aim of the scoping visits was to identify potential training participants for future AFAS training; clarify government policy on the role of the government and private sector treatment providers; qualify the demand for fumigation services; and assess practices, facilities and equipment used to conduct methyl bromide fumigations treatments.

The findings from the scoping visits were then used to plan the best approach to delivering fumigation training against each country's unique needs and to ensure training was targeted to produce sustainable outcomes.

The reports for the scoping visits to Samoa, Solomon Islands and Vanuatu are provided at Appendix C (includes three sub-appendices).

6.7 Input 7 – AFAS Training (Fumigation with Methyl Bromide for Quarantine Purposes) – Fiji

Fumigation training was conducted for 16 participants from BAF and the private sector on 11–14 November 2012 in Fiji. BAF staff that attended the Train-the-Trainer Course delivered the training.

Training resources for the AFAS Training (Fumigation with Methyl Bromide for Quarantine Purposes) are provided at Appendix A.

6.8 Input 8 – AFAS Audit Training Course – Fiji

An AFAS audit-training course was conducted on 21–23 November 2012 in Fiji and delivered to 10 BAF officers. Canberra-based AFAS staff conducted the training.

With Fiji seeking country accreditation under AFAS, the audit training provided the BAF officers with the skills to conduct an audit of a treatment provider accredited under AFAS.

Training resources for the AFAS Audit Training Course are provided at Appendix D (includes two sub-appendices).

6.9 Input 9 – AFAS Training (Fumigation with Methyl Bromide for Quarantine Purposes) – Fiji

Fumigation training for 22 quarantine officers and fumigation treatment providers from Fiji, Samoa, Solomon Islands, Tonga and Vanuatu was conducted on 26–30 November 2012 in Fiji. BAF staff that attended the Train-the-Trainer Course in July 2012 delivered the training under the supervision of Canberra-based AFAS staff.

Training resources for the AFAS Training (Fumigation with Methyl Bromide for Quarantine Purposes) are provided at Appendix A.

6.10 Input 10 – Development of Fumigation Procedural Manual, Industry Accreditation and Auditor Course – Solomon Islands

During this input (10–22 March 2013), auditor training was conducted to provide Solomon Islands Agriculture Quarantine Service (SIAQS) staff with an understanding of auditing terminology and techniques and the skills necessary to undertake an audit. Specifically, the pilot auditor-training course

was conducted to provide SIAQS staff with the skills and knowledge necessary to effectively manage an accreditation scheme whereby industry would be accredited to perform fumigations on behalf of SIAQS.

Workshops and meetings were also held during this input with SIAQS and industry stakeholders with the aim of seeking agreement on a methyl bromide fumigation standard (based on AFAS principles) and also of establishing an accreditation framework whereby industry could be accredited to perform fumigations on behalf of SIAQS to an agreed standard.

The report for the 10–22 March input is provided at Appendix E (includes 17 sub-appendices).

6.11 Input 11 – AFAS Training (Fumigation with Methyl Bromide for Quarantine Purposes) – Fiji

Fumigation training for 18 quarantine officers and fumigation treatment providers was conducted on 15–19 April 2012 in Honiara, Solomon Islands. Two BAF officers that attended the Train-the-Trainer Course in July 2012 delivered the training. An STA also delivered personal protective equipment (PPE) training during this input, following the purchase by PHAMA of gas monitor and leak detection devices and PPE for SIAQS.

6.12 Input 12 – Provision of Advice on Fumigation Equipment and Infrastructure Needs

Conducting fumigations requires specialist equipment that cannot be sourced locally. Consequently, assistance has been provided to the five PHAMA countries on an ongoing basis to aid quarantine services and treatment providers with advice for the purchase of fumigation equipment and PPE.

7 Deliverables

7.1 Management of the Delivery of Basic Fumigation Training, Train-the-Trainer and Audit and Verification Procedures Associated with Fumigation

With recognition that generally poor and unsafe methyl bromide fumigation practices were being conducted, quarantine departments and treatment providers in PHAMA countries have enthusiastically welcomed the AFAS methyl bromide fumigation training. To date, 136 quarantine officers and fumigation treatment providers from Fiji, Samoa, Solomon Islands, Tonga and Vanuatu have attended AFAS training, with 128 of these being assessed competent to perform fumigations to a standard compliant with AFAS requirements.

While initial AFAS training was conducted by AFAS staff, the Train-the-Trainer program has been an achievement. The now-qualified BAF trainers have not only delivered internal training to Fijian treatment providers and fellow BAF officers, but have also delivered the AFAS training course in the Solomon Islands with great success. Importantly also, providing AFAS training 'in-country' by using qualified BAF trainers is substantially more cost-effective than using AFAS staff or participants from different PHAMA countries being flown to a central location for training.

With in-country fumigation training not yet conducted in Samoa, Tonga and Vanuatu, there is a strong desire from these countries to have their own AFAS trainers. While this request is reasonable and somewhat expected, demand for training in the respective countries and the need for further trainers would need to be reviewed.

For countries to become accredited under AFAS, there is a requirement for quarantine agencies to conduct a minimum of two audits per year on registered fumigation companies participating in the scheme. With Fiji seeking AFAS country accreditation, BAF officers undertook auditor training that was delivered by AFAS in November 2012. Once AFAS country accreditation is granted, the trained BAF auditors will undertake audits to assess the capacity of registered fumigation companies to conduct fumigations to an acceptable standard.

With the recognition that not all PHAMA countries may seek AFAS accreditation in the first instance, and future market access protocols in some PHAMA countries may be developed based on industry accreditations, an alternate auditor-training course was developed and delivered as a pilot to senior SIAQS staff in March 2013. The auditor training provided SIAQS staff with an understanding of auditing terminology and techniques and the skills necessary to undertake an audit and effectively manage an industry accreditation scheme. While the AFAS audit course is specifically developed to audit the AFAS accreditation framework, the newly developed audit course provided participants with a broader overview of auditing, industry accreditation schemes and their management.

7.2 Revisions of PHAMA Countries' Fumigation Manuals

Preliminary work has begun with SIAQS by developing a draft fumigation operational procedure. The operational procedure's aim is as a primary document both to establish a standard for methyl bromide treatments in Solomon Islands and also to identify roles, responsibilities and the scope of accreditation for industry should a fumigation accreditation scheme be introduced.

Treatment providers are not required to develop and document their own quality manual based around their own particular business; rather, the operational procedure has been developed and will be agreed to as part of a consultative process with SIAQS and businesses/providers. This process should make the proposed fumigation accreditation scheme simpler to implement.

At the time of writing this report, SIAQS had endorsed the draft fumigation operational procedure and industry consultation was underway to seek agreement on its adoption.

Work previously undertaken in Tonga under the PHAMA Activity TONGA04 has resulted in the extensive development of the Ministry of Agriculture and Food, Forests and Fisheries (MAFFF) fumigation procedural manual for the Nuku'alofa fumigation facility. Although specific to the fumigation of export watermelons from Tonga to New Zealand, the fumigation manual complies with the AFAS standard for the fumigation of fresh produce. Should MAFFF wish to adopt AFAS accreditation or a similar standard for non-perishable methyl bromide fumigations, MAFFF will require a fumigation operational procedure to be developed similar to the procedure developed for SIAQS. It is envisaged that while MAFFF may not pursue AFAS accreditation in the short term, agreement on a recognised regional fumigation standard for all PHAMA countries needs to be negotiated as a matter of importance.

As with Tonga, work undertaken in Fiji under PHAMA Activity FIJI17 resulted in the development of the BAF fumigation procedural manual for the fumigation of export ginger from Fiji to Australia. Again, although specific to perishable fumigation, the fumigation manual complies with the AFAS standard for the fumigation of fresh produce. As Fiji is yet to gain AFAS country accreditation, it is unclear at this time how BAF will develop fumigation guidelines or procedures for AFAS industry participants and in what form.

Although participants from Samoa and Vanuatu attended AFAS training in Fiji in November 2012, in-country fumigation training for these countries has yet to be conducted. It is unclear at this time whether either country will be pursuing AFAS accreditation in the short-term or will adopt a similar approach to Solomon Islands.

7.3 Advice on Fumigation Equipment and Infrastructure Needs on an Ongoing Basis

Pre-screening and scoping visits had identified that PHAMA countries have little or no specialised fumigation equipment and that the fumigation equipment that is available is not serviceable.

Given the requirement for specialist equipment that cannot be sourced locally, assistance and advice has been provided to the five PHAMA countries on an ongoing basis to aid quarantine services and treatment providers with the purchase of fumigation equipment and PPE.

Equipment needs for the quarantine services fall into two categories. The quarantine service either will solely supervise or monitor fumigations performed by treatment providers, or will carry out the fumigation function. Hence, the equipment needs will be less for quarantine services that solely supervise and monitor fumigations. Equipment needs for the treatment providers will be the same as for quarantine services performing the fumigations.

The level of equipment required in PHAMA countries will be dependent on the fumigation standard that is adopted. It is estimated that an outlay in excess of A$10,000 is needed to purchase the basic

equipment necessary to conduct fumigations to the AFAS standard. The bulk of this outlay is for the gas concentration and gas leakage detection devices.

Initial purchases by PHAMA of fumigation monitoring and leak detection devices and PPE had been made for SIAQS in March 2013. At the time of writing this report, similar purchases were being made for the quarantine services of the other four PHAMA countries. To complement the purchases, it is anticipated that safety and PPE training will also be undertaken. The training will be similar to that conducted in Solomon Island and will focus on risk management, options for controlling risks, and the types of respiratory protection equipment.

8 Conclusion

Although AFAS staff identified during their initial screening that presently only Fiji fumigation providers and facilities are sufficiently developed, resourced and skilled to attain full AFAS accreditation, there is still a strong need for other PHAMA countries, once AFAS training has been delivered, to establish and maintain a reliable accreditation and audit process in order to ensure that fumigations are being conducted to an agreed and safe standard. While some PHAMA countries may not seek AFAS accreditation immediately, a reliable audit and verification process will provide a higher level of assurance that fumigations are being performed correctly, thus promoting confidence with established and potential trading partners.

While Fiji is seeking AFAS accreditation and SIAQS has indicated that they wish for industry to meet the AFAS standard when conducting fumigations, there has been insufficient dialogue with Samoa, Vanuatu and Tonga to determine whether these countries will be pursuing a fumigation standard equivalent to that required by AFAS. Ideally, should AFAS accreditation not be pursued in all countries, agreement on a recognised regional fumigation standard for PHAMA countries needs to be negotiated as a priority and recognition of this standard should be sought from trading partners.

Whereas it can be viewed that a step from no fumigation standard to a fumigation standard required by AFAS may be overly ambitious in some PHAMA countries, a significant underlying issue with the adoption of any standard is the relatively high costs of fumigation equipment required. It is estimated an outlay in excess of A$10,000 is needed to purchase the basic equipment necessary to conduct fumigations to the AFAS standard. While the majority of the equipment is relatively inexpensive to purchase or can be custom-made inexpensively, the gas concentration and gas leakage detection devices make up the major component costs. Although equipment sharing is a viable option to keep equipment costs down, particularly within the private sector, it is unlikely that this will occur in a business competitive environment.

Although one of the main objectives of this activity is to have methyl bromide fumigation treatments performed in an effective manner to an agreed standard, an overriding concern (particularly in countries where fumigation treatment providers are carrying out fumigations) is the threat that the price of the fumigation equipment may exclude some existing treatment operators and a monopoly may develop. This monopoly could effectively see the cost of fumigations increase to the point where it is not viable to fumigate certain goods. Realistically, to remain competitive, corners could be cut to keep the cost of a fumigation down, which could ultimately compromise or erode efforts to have a fumigation standard recognised by other countries. To overcome this, a reliable accreditation and audit process needs to be put into place by the quarantine services.

It is also apparent that the present cost to the client of performing fumigations (when conducted by industry treatment providers) can be highly variable. It is likely, however, that with the introduction of a robust and reliable accreditation system and fumigation standard (resulting in fairer competition among the providers), variability in costs should reduce. Unfortunately, what was identified during the scoping visits was that some exports were not economically viable due to the cost of the fumigation performed by treatment providers.

Ideally, the introduction of a standard will bring about consistent fumigation practices. What industry stakeholders identified, however, was the potential inability of regulators to enforce the standard. There were concerns expressed by industry stakeholders that the purchase of equipment may not be

uniform for all treatment providers and that inconsistencies may emerge, to the detriment of some parties. This comment, again not entirely unexpected, outlines the need for continued training of quarantine regulators to effectively manage an accreditation system.

While the AFAS training provides fumigators with the skills and knowledge to conduct fumigations in accordance with standards set by AFAS, there is an overarching need for the quarantine services and treatment providers to have documented procedures, work instructions and forms that describe roles, responsibilities and processes on how to conduct and record a fumigation in order to ensure consistent and repeatable fumigation practices. Without documented procedures, inconsistency in fumigation practices may occur that may potentially compromise the treatment, and oversight or auditing of fumigation practices is ineffective.

Safety and PPE training was also undertaken during this activity, following the purchase by PHAMA of gas monitor and leak detection devices and PPE for SIAQS. The training focused on risk management, options for controlling risks and the types of respiratory protection equipment. With further purchases of gas monitor and leak detection devices and PPE by PHAMA for the remaining four PHAMA countries to occur, it is important that similar safety and PPE training as that conducted in Solomon Islands is conducted.

As indicated previously, quarantine departments and treatment providers in PHAMA countries have enthusiastically welcomed the AFAS methyl bromide fumigation training and the supporting auditor and Train-the-Trainer programs. This activity to date has resulted in improved technical expertise with fumigators and regulatory officers and will assist in maintaining a high standard in fumigation performance and compliance. Ensuring effective fumigation treatments on imported cargo reduces the risk of exotic pests and disease entering the country and decreases the likelihood of failed fumigation on exported goods.

What now needs to build on from this initial work is the establishment of a regional fumigation standard and accreditation scheme between PHAMA countries in order to establish mutual recognition of, and maintain the integrity and effectiveness of, fumigation treatments. The strengthening of treatment, audit and verification processes through a regional fumigation standard and accreditation scheme will improve the integrity of the treatment activities. This will ultimately lead to better facilitation of trade, initially between PHAMA countries, but potentially also with Australia, New Zealand and other trading partners.

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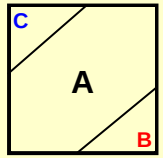
Appendix A Training Resources for the AFAS Training (Fumigation with Methyl Bromide for Quarantine Purposes)

Monitoring Ready Reckoner for Methyl Bromide

Australian Government
Department of Agriculture, Fisheries and Forestry
Biosecurity

Dosing Phase	Initial Dosage	24 g/m^3	32 g/m^3	40 g/m^3	48 g/m^3	56 g/m^3	64 g/m^3	72 g/m^3	80 g/m^3	128 g/m^3	Dosing is complete once ALL the required amount of gas has been applied to the enclosure.
Gas Distribution Phase **Start Point**	½ - 1 hr **after gas introduction** (75% or more of initial dose)	24.0 / 18	32.0 / 24	40.0 / 30	48.0 / 36	56.0 / 42	64.0 / 48	72.0 / 54	80.0 / 60	128 / 96	**Start Point is achieved when ALL monitor readings are at or above the Standard AND within 15% of the lowest reading (Equilibrium).** **The duration of the fumigation is measured from when the Start Point is achieved.**
	> 1 hr **after gas introduction** (70% or more of initial dose)	24.0 / 16.8	32.0 / 22.4	40.0 / 28	48.0 / 33.6	56.0 / 39.2	64.0 / 44.8	72.0 / 50.4	80.0 / 56	128 / 89.6	
Fumigation Phase **Methyl Bromide Concentration After Start Point**	2 hrs **after start point** (60% or more of initial dose)	19.4 / 14.4 / 9.4	24.2 / 19.2 / 14.2	29.0 / 24 / 19.0	33.8 / 28.8 / 23.8	38.6 / 33.6 / 28.6	46.4 / 38.4 / 30.4	51.2 / 43.2 / 35.2	56.0 / 48 / 40.0	84.8 / 76.8 / 68.8	**The exposure period commences when the Start Point has been reached.** **For example, if a 24 hr fumigation reaches Start Point 1 ½ hrs after dosing the fumigation is considered complete 25 ½ hrs after dosing and ALL concentrations are at or above the standard specified for 24 hrs.**
	4 hrs **after start point** (50% or more of initial dose)	17.0 / 12 / 7.0	21.0 / 16 / 11.0	25.0 / 20 / 15.0	29.0 / 24 / 19.0	33.0 / 28 / 23.0	40.0 / 32 / 24.0	44.0 / 36 / 28.0	48.0 / 40 / 32.0	72.0 / 64 / 56.0	
	12 hrs **after start point** (35% or more of initial dose)	13.4 / 8.4 / 3.4	16.2 / 11.2 / 6.2	19.0 / 14 / 9.0	21.8 / 16.8 / 11.8	24.6 / 19.6 / 14.6	30.4 / 22.4 / 14.4	33.2 / 25.2 / 17.2	36.0 / 28 / 20.0	52.8 / 44.8 / 36.8	
	24 hrs **after start point** (30% or more of initial dose)	12.2 / 7.2 / 3.0*	14.6 / 9.6 / 4.6	17.0 / 12 / 7.0	19.4 / 14.4 / 9.4	21.8 / 16.8 / 11.8	27.2 / 19.2 / 11.2	29.6 / 21.6 / 13.6	32.0 / 24 / 16.0	46.4 / 38.4 / 30.4	
	48 hrs **after start point** (25% or more of initial dose)	11.0 / 6 / 3.0*	13.0 / 8 / 3.0*	15.0 / 10 / 5.0	17.0 / 12 / 7.0	19.0 / 14 / 9.0	24.0 / 16 / 8.0	26.0 / 18 / 10.0	28.0 / 20 / 12.0	40.0 / 32 / 24.0	



A = Standard concentration

B = Minimum concentration to allow top up

C = Maximum top up concentration

*** Methyl bromide concentrations less than 3 g/m^3 are below the threshold for effectiveness.**

Version 2.8 - June 2012

Dosage Calculation

Enclosure volume calculation

height x width x length = volume

Example

2.5m x 2.4m x 6.2m = 37.2 m^3

⇒ Refer to Appendix B6 of the AQIS Methyl Bromide standard for information on how to calculate the volume for differently shaped enclosures.

Temperature compensation calculation

⇒ Add 8g/m^3 for every 5°C or part thereof below 21°C to a minimum of 10°C at NAP.

⇒ The minimum ambient temperature of the enclosure **MUST NOT** fall below 10°C throughout the fumigation.

Examples of adjusting the concentration for different temperatures

Standard timber concentration = 48g/m^3 at 21°C or above.

Temperature = 20°C

48g/m^3 + (8g/m^3 x 1) = 56g/m^3

Temperature = 13°C

48g/m^3 + (8g/m^3 x 2) = 64g/m^3

Temperature = 10°C

48g/m^3 + (8g/m^3 x 3) = 72g/m^3

Initial dosage calculation

volume x concentration = dosage

Examples

37.2m^3 x 48g/m^3 = 1,786g (1.79kg) at 21°C

37.2m^3 x 64g/m^3 = 2,381g (2.38kg) at 11°C

Chloropicrin (2%) compensation calculation

$$\frac{\text{(volume x concentration)}}{0.98} = \text{dosage}$$

Example

$$\frac{37.2m^3 \times 48g/m^3}{0.98} = 1{,}822g\ (1.82kg)$$

Equilibrium Calculation

Equilibrium Calculation

⇒ To be at equilibrium all concentration readings **MUST** be within 15% of the lowest reading and all readings are at or above the standard.

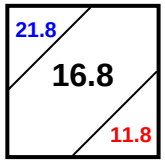
$$\frac{\text{(Highest – Lowest)}}{\text{Lowest}} \times 100 = \%$$

Example for readings of 49, 50 and 55

$$\frac{(55 - 49) = 6}{49} \times 100 = 12\%$$

Top Up Calculations

Example of top-up calculation



Starting concentration = 48g/m^3

At 12 hrs the lowest concentration reading = 17g/m^3

Maximum top-up concentration = 21.8g/m^3

Top-up dosage is **21.8 – 17 = 4.8g/m^3 x volume**

⇒ Top-up options are only to be used for fumigations longer than 12 hrs

Top-up during the fumigation

⇒ Multiple top-ups are only permitted where the concentration has not, at any time, fallen below the minimum concentration to allow top-up.

⇒ No extension of the fumigation period is required.

Top-up at the end of fumigation

⇒ Fumigation must be extended by 4 hrs at the end of which all monitor points must read at or above the standard.

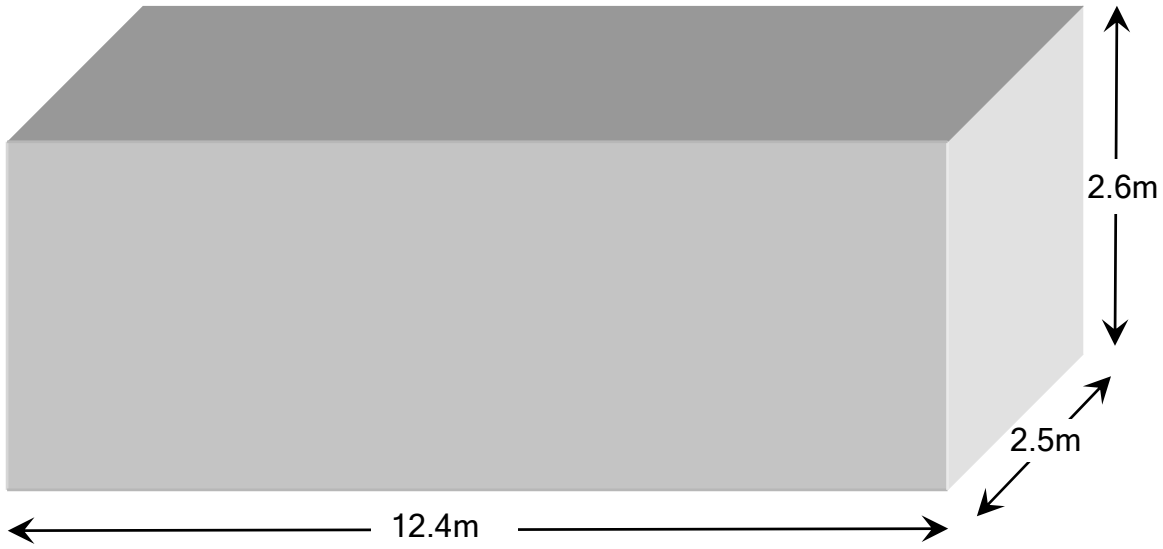
⇒ Only one top-up is permitted.

⇒ Allowed where concentration is below standard but above the minimum.

Assessment Calculations

Candidate Name: _____

When completing these exercises show the working for any calculations you do.



What is the volume of the enclosure above?

Width x Length x Height = Volume

= m^3

Calculate the dose for the above enclosure and, if your dispenser measures in 0.2kg increments, show how much methyl bromide you would actually use:

forecast minimum temperature is 14°C

the dose rate is 48g/m^3

100% Methyl bromide is used

And where:

98% Methyl bromide is used

Calculate if the following readings have achieved start point (start time):

Dose Rate = 48g/m^3 Concentration readings taken at ½ - 1hr 43, 40 and 47 What would you do next?	
Dose Rate = 80g/m^3 Concentration readings taken at >1hr 59, 54 and 61 What would you do next?	
Dose Rate = 48g/m^3 Concentration readings taken at >1hr 47, 46, 42 and 45 What would you do next?	

You are doing a fumigation where:

dose rate = 56 g/m³
duration = 24 hours
enclosure = 78.6 m^3
methyl bromide = 100%

What would you do when you have the following readings? If you choose to top-up show the calculations and amount of methyl bromide you would use.

At 4 hours 31, 29 and 34	
At 12 hours 26, 18 and 15	
At 24 hours 17, 19 and 19	
At 24 hours 14, 12 and 13	
At 24 hours 12, 14 and 8	

Training Feedback - Questionnaire

Please help to improve the quality of the training by completing this questionnaire

Location:_____ **Date:**_____

	Disagree				Agree
The objectives of the training were clearly stated and met	1	2	3	4	5
The training will be useful for my work	1	2	3	4	5
The content was relevant to me	1	2	3	4	5
The information was clear and each topic was covered in sufficient detail	1	2	3	4	5
The content was well structured and logical	1	2	3	4	5
The mix of classroom and practical training was appropriate	1	2	3	4	5
The scenarios helped me to understand how to apply the training in different circumstances	1	2	3	4	5
The trainer/s were well prepared	1	2	3	4	5
The trainer/s were knowledgeable	1	2	3	4	5
The trainer/s kept me interested	1	2	3	4	5
The trainer/s were friendly and helpful	1	2	3	4	5
The timing and pace of delivery allowed enough time to understand each topic	1	2	3	4	5
There was adequate time for questions and discussions	1	2	3	4	5
The duration of the training was appropriate	1	2	3	4	5
The venue was suitable	1	2	3	4	5
The training generally met my expectations	1	2	3	4	5

Please provide any explanations or make any comments or suggestions:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Name: _____ (Optional)

Calculation Exercises

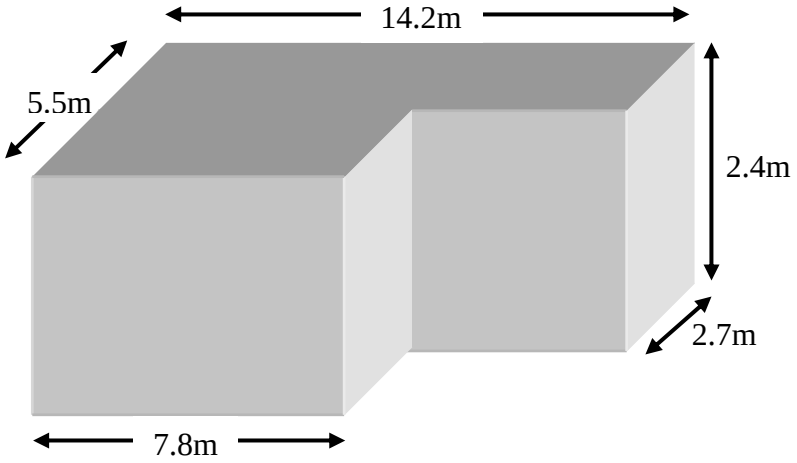
Name: _____

Calculating the dose

Dimensions of the enclosure Length – 14.5m Width – 2.4m Height – 2.6m	

Using the volume of the above enclosure calculate the dose for the following:

Dose rate = 48g/m^3 Forecast minimum temperature = 22°C	
Dose Rate = 48g/m^3 Forecast minimum temperature = 20°C	
Dose Rate = 128g/m^3 Forecast minimum temperature = 15°C Chloropicrin = 2%	



Calculate the volume of the above enclosure.

Volume = (14.2 x 2.4 x 2.7) + (2.8 x 7.8 x 2.4) =

Using this volume calculate the dose for the following:

Dose Rate = 128g/m^3 Temperature = 25°c Chloropicrin = 2%	
Dose Rate = 48g/m^3 Temperature = 15	
Dose Rate = 32g/m^3 Temperature = 20 Chloropicrin = 1.5%	

Calculating Equilibrium

Using the following initial readings calculate if they are in equilibrium

85.4, 73.1, 89.3	
145.2, 129.0, 136.8	
68.4, 71.4, 76.3, 73.7	

Start Point (Start Time)

Using the following readings determine if start point has been achieved

Dose Rate = 72 g/m^3 Readings at ½ - 1hr: 71.0, 58.2, 64.6	
Dose Rate = 48g/m^3 Readings at >1hr: 36.2, 37.4, 32.8	
Dose Rate = 64g/m^3 Readings at >1hr: 47.5, 44.9, 46.0	

Calculating the top-up dose

Calculate how much methyl bromide you can add for the following scenarios

The volume of the enclosure = 36.7m^3

The duration of the fumigation is 24 hours

During the fumigation

Initial dose = 56g/m^3 Readings = 32.1, 28.9, 24.4 Readings taken at 4 hours	
Initial dose = 128g/m^3 Readings = 75.2, 54.3, 59.6 Readings taken at 12 hours	

At the end of the fumigation

Initial dose = 64g/m^3 Readings = 20.2, 28.3, 11.4 Readings taken at 24 hours	
Initial dose = 48g/m^3 Readings = 20.2, 28.3, 11.4 Readings taken at 24 hours	
Initial dose = 72g/m^3 Readings = 20.2, 28.3, 11.4 Readings taken at 24 hours	

RECORD OF ASSESSMENT

AFAS - Methyl Bromide Fumigation Training

Candidate Details			
Name:			
Employer:		Location:	
Training Details			
Training Organisation:		Date:	
Course Version:		Venue:	
Course Presenters:			
Assessment Details			
Assessor Name:		Date:	
Organisation:		Time:	
Assessment Result			
Is the candidate competent?	Yes ☐	No ☐	
If not, what are the reasons?			
What action is required before the candidate can present for reassessment?			
General Comments			

Assessor Signature

Candidate Signature

Pressure Testing

What is the procedure for pressure testing a container?	Seal the air vents from the outside ☐ Insert a pressure test manifold or similar ☐ Increase the pressure inside to 250 Pa ☐ Allow the pressure to fall to 200 Pa and start timing ☐ Stop timing when the pressure reaches 100 Pa ☐ If the pressure decay time is less than 10 seconds the container must be sheeted ☐

Does the candidate know the procedure for performing a pressure test? Yes ☐ No ☐
Does the candidate know the minimum pressure decay time for a gas tight container? Yes ☐ No ☐

Comments:

Site Assessment

What factors do you consider when assessing a fumigation site?	Site: Well ventilated ☐ Enough room for a risk area ☐ Power supply – either mains or a generator ☐ Protected from the wind where possible ☐
	Risk: Proximity of occupied buildings, roads, paths ☐ Site can be isolated from unprotected personnel ☐ Wind direction ☐
	Fumigation floor: Impervious to MBr ☐ Free of cracks or expansion joints unless they can be sealed ☐ Drains no closer than 1 metre unless they can be sealed ☐
What option do you have if the fumigation floor is unsuitable?	Use a ground sheet ☐ Move the fumigation ☐ Do not fumigate ☐

Does the candidate understand the importance of conducting site and risk assessments? Yes ☐ No ☐

Is the candidate able to identify the key things they should consider when conducting a site assessment? Yes ☐ No ☐

Comments:

Consignment suitability

What might make a consignment unsuitable for fumigation with methyl bromide?	Methyl bromide might cause damage to the commodity A list can be found in the Standard (appendix 3) ☐ Materials other than the target commodity might be affected ☐
Why is free air space important?	Insufficient free airspace: 350 mm in total ☐ 200 mm above ☐ 50 mm below ☐ Helps circulation to get even distribution of gas ☐ Better penetration ☐ Faster ventilation ☐
	Impervious wrappings: Removed or cut to allow penetration ☐ Can be fumigated if they comply with the AQIS wrapping and perforation standard (Section 3.2) ☐
	Impervious coatings such as paint, lacquers, laminates etc ☐
	Timber thickness: 100 mm penetration into timber ☐ 200 mm maximum thickness for timber ☐ 5mm separation of timber very 200 mm ☐ Timber with impervious coatings must have at least one surface uncoated and maximum thickness of 100 mm from the uncoated surface ☐
What options do you have if the consignment is unsuitable?	The customer should be advised if there is a concern ☐ The customer should take responsibility ☐

Does the candidate understand that some materials can be adversely affected by methyl bromide? ..... Yes ☐ No ☐

Does the candidate know why free airspace is important and what the requirements are? ..... Yes ☐ No ☐

Does the candidate know what might prevent methyl bromide penetrating the commodity? .... Yes ☐ No ☐

Does the candidate know the restrictions on timber thickness? ..... Yes ☐ No ☐

Comments:

Monitoring Tubes

How many monitoring tubes are required and where should they be placed for enclosures:	
30 cubic metres or less?	A minimum of 1 ☐ At the top centre of the commodity ☐
1 container?	A minimum of 3 ☐ 1 at the top back of the commodity ☐ 1 in the centre of the commodity ☐ 1 at the front base of the commodity ☐
2 containers	1 at the top centre of the commodity in each container ☐ 1 at the front base of the commodity in either container ☐
3 or more containers?	1 at the top centre of the commodity in each containers ☐
What else should you do when setting up monitoring tubes?	Label according to their location in the enclosure ☐ Ensure they are free of kinks and blockages ☐ Seal them between readings ☐ Extend outside the risk area so readings can be taken without PPE ☐
Does the candidate know the requirements for setting up the monitoring tubes? .....Yes ☐ No ☐	
Comments:	

Supply Pipes

How many supply pipes are required and how should they be positioned?	1 supply pipe is required for each container in the enclosure ☐ At least 2 metres from the monitor tube outlets ☐ Direct the gas into the free air space to assist with circulation ☐
When using multiple supply pipes what is meant by a balanced system?	Each arm of the system must be of equal total length and diameter ☐
What is the benefit of using a balanced system?	Releases an equal amount of gas into each container simultaneously which will assist in evenly distributing the gas ☐
What should you do if you can't create a balanced system?	Release an equal amount of gas through each pipe in turn ☐
Does the candidate understand the requirements for setting up the supply system? ..... Yes ☐ No ☐	
Comments:	

Sheeting the Enclosure

What are the requirements for the sheet used to create a gas tight enclosure?	Impervious to methyl bromide ☐ Free from holes or tears ☐
How should the enclosure be sheeted to ensure that it is gas tight?	The sheet must extend at least 500 mm out on all sides ☐ Take extra care where leads etc exit the enclosure ☐ Use sand snakes to create a gas tight seal with the floor ☐ Fold and secure the corners ☐ Use a belly rope or other method to prevent flapping ☐
Why should the sand snakes only be filled to 65-75%?	So they lie flat on the floor ☐ So they can be bent around corners ☐
How should sand snakes be laid?	A minimum of 2 rows around the entire enclosure ☐ Laid overlapping like brickwork ☐ Use more where there is a greater chance of leaks Around corners ☐ The exit point for gas lines and power leads ☐ Cracks or joins in the floor ☐
Does the candidate know process for creating a gas tight enclosure with a sheet? ..... **Yes** ☐ **No** ☐ **Does candidate know the requirements for sand snakes?** ..... **Yes** ☐ **No** ☐	
Comments:	

Setting up the Risk Area

What is the minimum size for the risk area?	3 metres outside ..... ☐ 6 metres inside..... ☐
How should you set up the risk area ?	Create a physical barrier using ropes or similar..... ☐ Ensure the vaporiser and gas cylinders are inside the risk area..... ☐
What information should be on the signs?	Warning signs must be put in place ..... ☐ Indicate the fumigant used ..... ☐ Clearly indicate that the area is dangerous..... ☐ Be in the appropriate language ..... ☐ Display the contact details of the fumigator..... ☐ Start and expected end time of exposure period..... ☐ Date of treatment ..... ☐
When should the risk area be in force?	From the time you are ready to apply the gas until the enclosure has been fully ventilated and declared gas free ..... ☐
Who is allowed inside the risk area when it is in force?	People wearing the appropriate PPE..... ☐ Only persons who are directly involved in the fumigation ..... ☐

Does the candidate know the requirements for creating risk area? ..... Yes ☐ No ☐
Do they know when the risk area should be in force and who can enter it during that time?..... Yes ☐ No ☐

Comments:

Dose Rate

Are there any times you must adjust the dose rate because of temperature?	Increase by 8g/m^3 for every 5°C or part thereof the temperature is expected to fall below 21°C ☐ No adjustment permitted to reduce the rate for temps above 21°C ☐
Why is the dose rate adjusted below 21°C?	Insect activity decreases with lower temperature so they take up less fumigant ☐
How do you know what the minimum temperature is?	Check the official weather forecast for the closest location ☐
What is the minimum temperature to permit fumigation?	10°C ☐
What options do you have if the temperature is forecast to fall below 10°C?	Use heaters in the enclosure to raise the temperature in the enclosure ☐ Fumigate inside a heated structure ☐ Do not fumigate ☐

Does the candidate know how to adjust the dose rate for the minimum temperature? ..... Yes ☐ No ☐

Does the candidate what to do if the minimum temperature is expected to fall below 10°C?.... Yes ☐ No ☐

Comments:

Applying the Gas

Why must you use a vaporiser?	Fully vaporise the MBr ☐ Prevents damage to the commodity from pooling of liquid MBr ☐ Better circulation ☐ Better penetration ☐
What is the minimum temperature the water can be while releasing the gas?	65°C ☐
What is the easiest way to know that the water is over 65°C?	Keep the water on the boil while releasing the gas ☐
If the water stops boiling how can you tell if it is still hot enough?	Hold the supply pipe about a metre from the outlet, it should be almost too hot to touch ☐
What should you do if the water temp falls too low?	Stop the release of gas until the water heats up again and restart the release more slowly ☐
What things should you do before you release any gas into the enclosure?	Inspect the sheet for any holes and repair ☐ Turn on the fans ☐ Check the fittings and connections ☐ Check that any unused manifold outlets are closed ☐ Check that the water is boiling in the vaporiser ☐ Remove any unprotected personnel from the risk area ☐
What is the procedure for leak checking?	Release a small amount of gas into the system and check for leaks ☐

	Check the supply system for leaks during gas release ☐ Check the enclosure for leaks Any repairs made to the sheet ☐ The seal between the sheet and the fumigation floor ☐ Pay particular attention to corners and exit points ☐ Fix any leaks and recheck ☐

Does the candidate understand the importance of using a vaporiser? Yes ☐ No ☐

Does the candidate know how to manage the temperature of the vaporiser? Yes ☐ No ☐

Does the candidate know what they should do before releasing any gas into the enclosure? Yes ☐ No ☐

Does the candidate know the process for leak checking and where they are most likely to occur? Yes ☐ No ☐

Comments:

Circulating the Gas

How many fans should you use?	A minimum of 1 fan in each container ☐ Larger enclosures require at least 2 fans ☐
How long should you run the fans?	As long as necessary to achieve equal gas distribution (equilibrium) ☐ Turn them off before taking any concentration readings ☐
When is the gas considered to be evenly distributed?	Equilibrium: The highest reading is within 15% of the lowest reading ☐
What should you do if you don't get equilibrium?	Restart the fans and run until equilibrium is achieved or the concentration falls below the standard ☐

Does the candidate understand the concept of equilibrium? Yes ☐ No ☐

Does the candidate know the factors that contribute to good gas circulation? Yes ☐ No ☐

Comments:

Concentration Monitoring

When must you take concentration readings?	At the start..... ☐ At the end..... ☐
For a 48 hour fumigation?	Another reading around 24 hours ..... ☐
When does the fumigation exposure period start?	When all readings are at or above the standard and in equilibrium ..... ☐
When might you want to do additional readings?	If you are fumigating a highly sorptive commodity ..... ☐ Sorption by the commodity will reduce the amount of free MBr which may result in the concentration falling below the standard ..... ☐ If the initial readings are just above the Standard ..... ☐
What information should you record when taking readings?	The concentration reading from each line..... ☐ The time the readings were taken..... ☐

Does the candidate know how many readings are required and when they should be done? .. Yes ☐ **No** ☐

Does the candidate know when the fumigation exposure period starts? ..... Yes ☐ **No** ☐

Comments:

Topping - up

When are you permitted to top-up the level of MBr?	At any time during the fumigation exposure period provided that the concentration at any of the monitor points is not below the minimum level to allow top-up ..... ☐ The fumigation exposure time is more than 12 hours ..... ☐ At the end of the exposure period provided that the concentration at any of the monitor points is not below the minimum level to allow top-up ..... ☐
How long must you extend the fumigation for if topping up at the end?	4 hours..... ☐
After 4 hours the readings are below the standard but above the minimum what can you do?	The fumigation has failed, only one end-point top-up is permitted..... ☐
How much MBr can you add?	Up to the maximum top-up concentration specified in the ready reckoner ..... ☐

Does the candidate understand the requirements for topping up? ..... Yes ☐ **No** ☐

Does the candidate know how much MBr you can add when topping up ..... Yes ☐ **No** ☐

Comments:

Ventilation

What should you do before you start ventilation?	Do a risk assessment: Wind direction ..... ☐ Notify site management ..... ☐ Notify unprotected personnel in the area ..... ☐ Put on your PPE ..... ☐
What is the Threshold Limit Value (TLV) for Australia?	5 ppm ..... ☐
What does it mean?	The safe level of MBr you can be exposed to without PPE for 8hrs..... ☐
How do you measure TLV?	Use stain tubes or other suitable equipment capable of accurately measuring down to 1ppm..... ☐
If you don't achieve TLV what should you do?	Turn the fans on again and continue to ventilate ..... ☐ Retest and record the results – readings and time ..... ☐

Does the candidate know the recommended procedure for ventilating a sheeted enclosure?.. Yes ☐ No ☐
Does the candidate know how to measure the TLV and value for Australia? ..... Yes ☐ No ☐

Comments:

Scenario 1

You are asked to fumigate the timber pallets in 3 containers. The documentation you have describes the goods on the pallets as air-conditioning components. You open the containers and find that some of the equipment is strapped directly to the pallets while other pallets are stacked with cardboard cartons and plastic wrapped. The plastic wrapping does not cover the base or the top. The pallets are only stacked one high so there is plenty of free airspace above, below and around each pallet.

Based on this information what concerns, if any, might you have about the suitability of the consignment for fumigation with methyl bromide?

If you do consider there may be potential problems what would you do about it?

Assuming that any concerns you may have had with the consignment have been addressed you enclose the 3 containers under a single fumigation sheet. You do not have the equipment to create a balanced supply system so you need to release the gas into each container in turn. You release an equal amount into each container starting from the left container then the middle and finally the right. After adjusting for temperature the dose rate is 56g/m^3 and you take your first readings after running the fans for 40 minutes.

You get the following readings:

Left = 49

Middle = 56

Right = 55

What do you do now?

A storm passes through a couple of hours after you start the fumigation so you decide to check the concentrations approximately 4 hours after the start time.

The readings are:

Left = 26

Middle = 38

Right = 40

You inspect the sheet and find a small tear near the left container, what do you do?

Scenario 2

You have been asked to fumigate five 40ft containers. The fumigation site is large and the surface is quite suitable. It can easily accommodate any configuration of the containers.

You have the following equipment available for use on the job.

- 2 fumigation sheets that can each cover a maximum of 3 containers at a time provided that the containers are not more than a metre apart.
- a vaporiser that meets the recommended specification.
- a 4 outlet manifold
- 4 x 5 metre supply pipes of equal diameter that attach to the manifold
- 4 T pieces which can be used for branching the supply pipes
- Several 3 metres lengths of supply pipe
- The supply pipes have fittings which allow them to be easily attached to the manifold, the T pieces or each other.
- Monitor tubes that can be cut to length as required.
- Any other equipment you might reasonably need in addition to that described above.

Draw a diagram showing how you would set-up the fumigation. Your diagram should show the following:

The arrangement of the containers including which doors are open

The supply pipe set up and positioning

The monitor line set up and positioning

The set up of the risk area.

AQIS Methyl Bromide Fumigation Training

Version 3.9

Trainee Workbook

Name:_____

Australian Government

Australian Quarantine and Inspection Service

AQIS METHYL BROMIDE FUMIGATION STANDARD

Version 1.7
November 2011

CONTENTS

How to use this Standard

This standard is divided into two main sections:

- **AQIS Requirements**
- **Descriptive Appendices**

AQIS Requirements

AQIS requirements for this section are designed to be subject to audit during quality control procedures, either by AQIS, by other quarantine authorities or by authorised agents of either.

This section is divided into two main columns:

MANDATORY

This column lists conditions that **MUST** be achieved and actions which **MUST** be undertaken in order to conform to the requirements of the AQIS Standard.

INFORMATIVE

This column lists information that may be helpful to a fumigator in achieving the Mandatory Requirement.

Appendices

These appendices provide information on a range of issues that may be helpful to a fumigator on various aspects of the fumigation procedure.

MANDATORY		INFORMATIVE
FUMIGANT CONSIDERATIONS – RISK ASSESSMENT, COMMODITY, DOSAGE, TEMPERATURE		
1.1 Risk assessment		
1.1.1 Before commencing any fumigation process a risk assessment must be carried out.		The purpose of risk assessments is to ensure that any fumigation undertaken is carried out in such a way that minimises any Occupational Health and Safety (OH&S) risks, meets local regulations, protects the local population and the environment,and addresses potential adverse effects on the commodity being fumigated. A risk assessment may be written or visual, as appropriate
1.2 Commodity (Non perishable)		
1.2.1 The commodity must be suitable for methyl bromide fumigation.	See the Import Conditions (ICON) database www.aqis.gov.au/icon for information on specific commodities.	Some commodities are unsuited to this treatment as they absorb large quantities of methyl bromide e.g oils, fats and finely ground materials. This may cause tainting or phyto-toxicity and may lead to hazards such as the presence of excessive bromide residues. This may result in the fumigated commodity not being suitable for its intended use. If there is concern that a commodity may be adversely affected by methyl bromide, importers, exporters and fumigators should seek expert advice (outside of AQIS) regarding its effects or conduct tests on the commodity. See APPENDIX 3: Commodities for which problems may occur when fumigated with methyl bromide. This table lists some commodities for which experts have found problems when fumigated with methyl bromide. **This list is not comprehensive and is provided for guidance only.**
1.3 Commodity (Perishable)		
1.3.1 Fumigation of nursery stock must only be performed in Australia. **1.3.2 Fumigation of fresh flowers must only be performed in Australia (unless exemptions are in place).**		Perishable commodities include cut flowers, fresh fruit, vegetables and nursery stock. Additional requirements for the fumigation of perishable goods are set out in APPENDIX 1: Fumigation of perishable commodities

<table>
<tr><th>MANDATORY</th><th>INFORMATIVE</th></tr>
<tr><td colspan="2"><h2>1.4 Dosage</h2></td></tr>
<tr><td>1.4.1 Dosage must conform to:
Permit conditions to import Quarantine Material into Australia;
AQIS Import Conditions (ICON) database outside Australia;
Quarantine Directions (within Australia).</td><td>Overdosing (the application of fumigant at rates above those specified by AQIS) to compensate for poor fumigation practice or inadequate equipment or sheeting should not be undertaken.

See the ICON database (www.aqis.gov.au/icon)</td></tr>
<tr><td>1.4.2 For the majority of commodities (excluding perishables) AQIS treatment dosages must be based on the anticipated minimum ambient temperature that the commodities inside the fumigation enclosure will experience during the fumigation period.</td><td>
TABLE 1 :
COMMON STANDARD DOSAGE
FOR METHYL BROMIDE FUMIGATION
<table>
<tr><td>PEST/COMMODITY</td><td>REQUIRED CONCENTRATION</td></tr>
<tr><td>Giant African Snail</td><td>128g/m³ at 21 °C for 24 hours at Normal Atmospheric Pressure (NAP)</td></tr>
<tr><td>Khapra Beetle</td><td>80 g/m³ for 48 hours with a minimum concentration of 24 g/m³ after 24 hours at NAP</td></tr>
<tr><td>Stored Product Pest of Quarantine concern</td><td>32 g/m³ at 21 ºC for 24 hours at NAP</td></tr>
<tr><td>Timber</td><td>48 g/m³ at 21 °C for 24 hours at NAP</td></tr>
</table>
</td></tr>
</table>

MANDATORY		INFORMATIVE
1.5 Temperature		
1.5.1 Fumigation for quarantine purposes is not permitted if the ambient minimum temperature falls below 10 °C.		At temperatures below 10 °C the fumigant has decreased effectiveness against pests, and more of the gas may be absorbed by the commodity. Excessive fumigant uptake can pose an increased safety risk, as the gas is difficult to remove from the commodity.
1.5.2 Dosage must be compensated for temperatures below 21 °C.	For each 5°C (or part of 5°C) the temperature is expected to fall below 21 °C, 8g/m³ must be added to the dosage, unless otherwise specified by AQIS. For example, using the standard dosage of 48g/m³ for a 24 hour exposure period, the dosage at: **21 °C and above is 48 g/m³** **16 – 20 °C is 56 g/m³** **11 – 15 °C is 64 g/m³** **10 °C is 72 g/m³** The fumigation provider must record the temperature information on the fumigation certificate.	**Minimum ambient temperature** The **minimum ambient temperature** that the fumigation enclosure is expected to experience over the duration of the treatment should be determined by checking with the official weather bureau in the country where the fumigation is taking place. This temperature should be used when determining the dosage. Alternatively, temperature recording equipment may be used to verify the temperature within the enclosure during the fumigation exposure period. See APPENDIX 5: Example of a fumigation certificate.
1.5.3 Heating of fumigation enclosures.	The temperature in the fumigation enclosure must be raised above 10 °C during fumigation if the minimum temperature inside the enclosure is expected to fall below 10 °C.	Heaters incorporating a fan and thermostat may be used for this purpose. Flash proof heaters should be used if the commodity is flammable. Consideration can also be given to storing and fumigating the commodity in heated warehouses during extended cold periods.

MANDATORY		INFORMATIVE
THE FUMIGATION SITE		
2.1 Site requirements		
2.1.1 The fumigation site must: • **Be able to be isolated from unprotected personnel.** • **Be well ventilated.** • **Be sheltered from high winds (as much as possible).** • **Have a smooth gas impervious floor (see 2.2 Site Floor).** • **Have a power supply available (either mains or generator).**		The site should be protected from adverse weather conditions such as high winds that can affect fumigation performance. Electrical power or a generator will need to be accessible on site, to run fans and heaters during fumigation treatments.
2.2 Site floor		
2.2.1 The fumigation site floor must be impermeable to the fumigant if fumigation under gas proof sheets is to be carried out.	The floor of any site used for sheet fumigation must be: • Flat and free of stones and other sharp objects so that a gas-tight seal can be made between the sheets and the floor; • Free of cracks (including unsealed expansion joints in concrete floors) and drains or any other openings that will reduce the gas-tightness of the enclosure. Where unsealed cracks or drains are present, they must be no closer than 1 metre from the fumigation enclosure.	Surfaces sealed with concrete or hot mix asphalt, that is, with a smooth surface finish that are in good condition and meet the requirements listed to the left, generally provide good floor surfaces for effective fumigation. Where unsealed cracks exist in a floor intended for fumigation, they may be sealed with an impervious sealant. Surfaces such as soil (including cement consolidated soil), sand, base rock and paving (stones or blocks) do not provide a suitable floor for a fumigation enclosure. • On porous or unsuitable surfaces, floor sheets should be used for sheet fumigation; • Gas proof sheets should be used or the floor should be permanently sealed; • Plastic sheeting or paper containing a tar (asphalt) layer may be used for this purpose.

MANDATORY		INFORMATIVE
CONSIGNMENT SUITABILITY FOR FUMIGATION		
3.1 Fumigant circulation		
3.1.1 There must be sufficient free air space to circulate the fumigant and achieve uniform distribution throughout the enclosure.	The fumigator must be able to demonstrate that the required concentration of methyl bromide can reach the target of the fumigation by taking and recording concentration readings from representative points within the enclosure. See 5.1 Monitoring tubes and, 7.2 Distributing fumigant within the enclosure	The free air space requirements for effective treatment of a consignment will vary depending on the commodity and the method of packing. As a guide, there should be at least 350 mm of free airspace in total with 200 mm free air space above the commodity, 50 mm below and the remaining 100 mm at the sides and between the commodity. Where commodities are stacked on the floor there must be sufficient free air space between individual items to allow the fumigant to act effectively on the target of the fumigation throughout the entire enclosure. If there is insufficient space to allow the monitoring tubes to be positioned according to the requirements then it is unlikely that the consignment can be fumigated effectively.
3.1.2 Timber must be separated by a minimum of 5 mm of air space in one dimension every 200 mm.	The separators must allow for any sagging to ensure that the 5 mm minimum separation is maintained along the entire length of the timber.	

MANDATORY		INFORMATIVE
3.2 Fumigant penetration		
3.2.1 The target of the fumigation must not be wrapped in or coated with materials that are impervious to methyl bromide.	The fumigator must verify that the consignment is not wrapped in impervious materials that may prevent the methyl bromide from reaching the target of the fumigation. The fumigator must verify that the target of the fumigation does not have impervious surfaces or coatings such as paints, lacquers and veneers that may prevent the effective penetration of methyl bromide. Impervious wrappings such as plastic, tarred or waxed papers, aluminium foil etc. must be perforated, cut or removed prior to fumigation to allow the methyl bromide to reach the target of the fumigation. Impervious wrapping does not need to be cut or removed prior to fumigation if it conforms to the AQIS wrapping and perforation standard and is not more than one layer thick.	If the consignment cannot be fully inspected for impervious materials because of problems with accessibility the fumigator can; • Rely on a packing declaration from the supplier/shipper/ packer that describes how the consignment is packaged and what packing materials have been used that allows assessment of the consignment's suitability for fumigation. Or, if this documentation is not available; • Contact another party that has sufficient knowledge of the consignment to obtain a written declaration that states that it is free from impervious surfaces or wrappings that would prevent an effective fumigation. If suitable declarations cannot be obtained the container should be unpacked for inspection prior to fumigation. The inspection must be conducted either by the fumigator or by another party that subsequently provides the fumigator with a written declaration indicating that it is free from impervious surfaces or wrappings. **The AQIS Wrapping and Perforation Standard** To meet AQIS perforation requirements for fumigation impervious materials must contain not less than four (4) perforations of 6 mm diameter / 100 cm^2 (10 cm x 10 cm square) or five (5) perforations of 5 mm diameter / 100 cm^2. Plastic wraps containing numerous pinholes (at least 6 holes / cm^2), frequently used for transportation of fruit and vegetables are also acceptable.
3.2.2 Untreated timber products must have at least one physical dimension which is less than 200 mm thick.	Timber products must be fumigated before any surface coating such as lacquering or paint is applied unless the product has at least one uncoated surface and a maximum thickness of 100 mm from the uncoated surface.	Methyl bromide will, in general, only penetrate 100 mm from the surface into timber within the fumigation exposure period.

MANDATORY	INFORMATIVE
THE FUMIGATION ENCLOSURE	
FUMIGATION TREATMENTS FOR QUARANTINE PURPOSES MUST BE CARRIED OUT IN GAS-TIGHT ENCLOSURES	
4.1 Sheet fumigation	
4.1.1 Containers must be fumigated under gas proof sheets unless it can be shown that they comply with the AQIS pressure test standard for gas-tightness. **4.1.2 Prior to every treatment all fumigation sheets must be visually inspected for tears, holes and abrasions. These must be repaired or the sheet replaced.**	For any sheet fumigation: • Fumigation sheets must be positioned or protected with suitable padding to avoid any sharp corners or objects that might damage them; • Sheets must be arranged so that there is at least 500 mm of sheet extending beyond the limit of the seal; • In high winds, ropes or belts must be used to hold fumigation sheets in place to prevent them from flapping loose; • Corners and areas where ropes, electrical leads, gassing pipes and monitoring tubes emerge from between or under the sheets must be tightly sealed; • Loose fumigation sheeting on corners of stacks must be secured by folding, rolling and clipping to prevent blowing out in the wind; • Where more than one container is being fumigated under sheet, at least one door of each container must be fully opened.	**Joining fumigation sheets** Fumigation sheets can be joined by tightly rolling a 400 mm to 500 mm overlapped join, which should be secured by tight gripping welding style clips. Joins should be made on, and supported by, a solid surface e.g. a container roof or wall. When battens are used, there must be at least three to four full turns of the sheets around the battens and the rolled sheets must be held together with tight gripping clips. To prevent joined sheets from coming apart they should be secured with weights or ropes.

<table>
<tr><th>MANDATORY</th><th>INFORMATIVE</th></tr>
<tr><td colspan="2"><h2>4.1 Continued</h2></td></tr>
<tr><td colspan="2">4.1.3 The sheets must:
• Be free from any defects (for example faulty seams/welds, tears or holes);
• Have a permeability of less than 0.02 grams per square metre (of fumigation sheet) per 24 hours (multiplied by the dose in g/m³).

4.1.4 Sheets must be positioned to create a gas-tight seal with the floor. Sand or water snakes used to seal the junction of fumigation sheets and the floor must be overlapped and positioned to prevent fumigant leakage. See 5.4 Sand and water snake specifications</td><td>Thinly coated, woven materials allow too much gas to be lost and are unsuitable as fumigation sheets.

Pool liners or annealed polypropylene sheets are also unsuitable as they allow methyl bromide to escape too rapidly.</td></tr>
<tr><td colspan="2"><h2>4.2 Using gas-tight containers as fumigation enclosures</h2></td></tr>
<tr><td colspan="2">4.2.1 Pressure testing must be undertaken every time any container is fumigated without sheeting If the decay time between 200 Pa and 100 Pa is less than 10 seconds, the container must be enclosed under a gas proof sheet before being fumigated with methyl bromide.</td><td>See APPENDIX 6: Pressure testing enclosures for gas-tightness.</td></tr>
</table>

MANDATORY		INFORMATIVE
4.3 Pressure testing requirements for un-sheeted containers		
4.3.1 A pressure decay time from 200 to 100 Pa of 10 seconds or more must be achieved to certify that a container is gas-tight.	The pressure within the container must be raised to 250 Pa and the decay time from 200 Pa to 100 Pa must be measured. The pressure decay time must be 10 seconds or more. If a container does not pass this test then it must be enclosed under a gas-proof sheet before fumigation. Containers which pass the pressure test may be fumigated with methyl bromide without enclosing them under gas proof sheets, and they must be treated as a sheeted enclosure from this point forward. Care must be taken to ensure that monitoring tubes, fumigant supply pipes and electrical leads introduced into a container after the pressure test are adequately sealed to maintain a gas-tight condition.	To perform a pressure test, the pressure inside the closed container should be raised to 250 Pa using high-pressure compressed air supplied from a portable compressor or gas cylinder. As the pressure inside the container reaches 250 Pa, turn off the compressed air supply and: • Allow the pressure to decay to 200 Pa; • Start measuring the time (in seconds) when it reaches 200 Pa; • Stop measuring the time (in seconds) when it reaches 100 Pa; • Record the pressure decay time.

MANDATORY		INFORMATIVE
4.4 Chamber fumigation		
4.4.1 A permanent chamber used for fumigation must meet the pressure test requirements.	A pressure test must be performed not less than twice a year. A general maintenance check must be performed at least once a year. See 4.3 Pressure testing requirements for un-sheeted containers. Door seals must be inspected before undertaking each fumigation treatment.	Chamber fumigation refers to fumigation treatments performed inside specifically designed chambers or permanently situated containers adapted for this purpose. The following actions should occur before performing any chamber fumigation: • Check that the chamber is not damaged and that there are no objects between the chamber and the chamber door to impair the seal; • Visually inspect the door seals of the chamber and replace where necessary.
4.4.2 Monitoring tubes must be placed within the fumigation chamber.	See 5.1 Monitoring tubes.	
4.4.3 Fumigant supply pipes must be placed within the fumigation chamber.	See 5.2 Fumigant supply pipes.	
4.4.4 Fans must be placed within the fumigation chamber.	See 5.3 Fans	**NOTE** The use of an exhaust fan will aid in the ventilation of the chamber.
4.4.5 Where heating is required, a flash-proof heater(s) must be placed within the fumigation enclosure.	See 1.5 Temperature	

MANDATORY		INFORMATIVE
4.5 Safety		
4.5.1 The fumigation enclosure and the surrounding area must be made safe for unprotected personnel.	A 'risk area' must be set up with a minimum of 3 metres clearance around the sheeted fumigation enclosure in the open, or 6 metres clearance in an enclosed area, and warning signs put in place. The area must be cleared of any unprotected personnel, that is, personnel not wearing a respirator, and at no time during the fumigation treatment should unprotected personnel be allowed to enter the 'risk area'.	
4.5.2 A full-face respirator or self-contained breathing apparatus must be used when releasing fumigant and while working within the risk area after the fumigant has been released.	Respirators must be fitted with a correct gas cartridge and specified by the manufacturer as suitable for methyl bromide (AX filter type).	Gas filter canisters should be used and replaced in accordance with the manufacturer's instructions.

PREPARING THE FUMIGATION ENCLOSURE

5.1 Monitoring tubes

MANDATORY		INFORMATIVE
5.1.1 All fumigations must be monitored. For enclosures larger than 30 cubic metres (equivalent to the average internal volume of a 20 ft shipping container), a minimum of three monitoring tubes must be positioned within the enclosure. **5.1.2 For enclosures smaller than 30 cubic metres, a minimum of one monitoring tube must be placed at the top centre of the commodity being fumigated.** **5.1.3 For commodities not fumigated inside a container (e.g. large items of industrial and agricultural machinery, bagged grain, stacks of timber) the entire enclosed space within the fumigation sheets must be treated as a single fumigation enclosure.**	Monitoring tubes must be placed as far as practicable from fumigant supply pipes. **ONE container** must have one monitoring tube placed: • **at the top back of the commodity** – as far from the doors as possible; • **as close to the centre of the commodity** as is practicable; • **at the front base of the commodity**. **TWO containers** (in the one enclosure) must have one monitoring tube placed: • **at the top centre of the commodity** in each container; • **at the front base of the commodity** in either container. **THREE containers or more** (in the one enclosure) must have one monitoring tube placed: • **at the top centre of the commodity** in each container. See APPENDIX 7: Monitoring tube placement for container fumigation.	Monitoring tube inlets should be at least 2 metres from the outlet of fumigant supply pipes. Before placing monitoring tubes inside an enclosure, ensure that: • Each monitoring tube can be identified through the use of tags or individually coloured tubes. **Fumigant monitoring tube specifications** Crush-proof nylon or hydraulic tubing or similar (3 mm external diameter and approximately 2 mm internal diameter) is effective for monitoring gas concentrations when containers and other enclosures are fumigated. Care should be taken to ensure that: • The monitoring tubes do not absorb methyl bromide; • A free flow mixture of gas/air can be maintained; • No kinks or blockages are present in the tubes; and • Monitoring tubes extend beyond the boundary of the risk area.

MANDATORY		INFORMATIVE
5.2 Fumigant supply pipes		
5.2.1 Fumigant supply pipes must be positioned to allow the fumigant to be introduced into the free air space around the commodity.	Fumigant supply pipes must be placed as far as practicable from fumigant monitoring tubes.	Monitoring tube inlets should be at least 2 metres from the outlet of fumigant supply pipes. **Sealing fumigant supply pipes** To prevent leakage from supply pipes: • Make a gas-tight seal around every supply pipe exit point from the enclosure; • Seal the exposed ends after the fumigant has been introduced into the enclosure.
5.2.2 Multiple containers under the one enclosure must have a fumigant supply pipe in each container.	Where multiple fumigant supply pipe systems are used, the entire system must be balanced in order to achieve even distribution throughout the enclosure. In order to balance the system, each arm of the system must consist of fumigant supply pipes that are equal in total length and diameter.	**Multiple fumigant supply pipes per enclosure** The use of multiple fumigant supply pipes will assist in distributing the fumigant when large enclosures or several containers in the one enclosure are treated. Where the system is balanced, it is possible to effectively deliver all of the fumigant through the entire system simultaneously. Where the system cannot be balanced, the correct amount of fumigant should be dispensed through each supply pipe in turn until the total amount of fumigant is applied. See APPENDIX 8: Fumigant gas supply pipe systems.

MANDATORY		INFORMATIVE
5.3 Fans		
5.3.1 Fans must be positioned to ensure that the fumigant is rapidly and effectively distributed throughout the fumigation enclosure. **5.3.2 For methyl bromide fumigation in small enclosures (such as freight containers), at least one fan must be used. For fumigation in larger enclosures, at least two fans must be used.** **5.3.3 Where multiple containers are fumigated under the same sheets, fans must be placed in each container.**	The fans must be switched on 10-15 minutes before the gas is introduced and for 30 minutes after the introduction of the methyl bromide, or until gas monitoring indicates that uniform gas distribution has been achieved.	Where high velocity and high volume fans are used, they should not run for longer than 15 minutes after the introduction of the gas, as they may force the fumigant out of the enclosure. Fans should have a capacity to make at least 20 air changes an hour, taking into consideration the volume of the enclosure
5.4 Sand and water snake specifications		
5.4.1 When using sand snakes, a minimum of two rows of sand snakes must be placed side by side with joins overlapping (like brickwork), and laid flush against the enclosure to create a continuous seal.	Sand snakes must be filled to only 65% - 75% with sand so that they lie flat on the fumigation floor.	Additional sand snakes may be placed on corners and other areas where fumigant leakage may be higher due to folds in the sheet or the presence of pipes or electrical leads.
5.4.2 When using water snakes a single, continuous water snake must be laid flush against the enclosure to create a continuous seal.	Water snakes must be filled to only 75% - 85% of capacity so that they lie flat on the fumigation floor.	If water snakes are used, the sheets should be weighed down and sealed using a single, continuous water snake placed flush against the enclosure. Particular attention should be given to ensure a complete seal where the ends of the water snake meet. Water snake placement should not start or end on a corner.

MANDATORY		INFORMATIVE
CALCULATING THE DOSAGE OF FUMIGANT REQUIRED		
6.1 Calculation of fumigation enclosure volume		
6.1.1 The volume of a fumigation enclosure must be calculated from the measured dimensions.	When fumigating sheeted enclosures the measured **external** dimensions must be used Where an enclosed un-sheeted container or chamber is used for fumigation, the volume of any gas circulation equipment external to the chamber must be included in the calculation of the enclosure volume, together with the known **internal** volume of the container or chamber See APPENDIX 9: Calculating the volume of differently shaped fumigation enclosures.	The volume of most freight containers is commonly found on the outside of the container, but this measurement can only be used if the container is not sheeted and has been satisfactorily pressure tested. See 4.3 Pressure testing requirements for un-sheeted containers.
6.2 Calculation of fumigant dosage		
6.2.1 The dosage of methyl bromide applied to a fumigation enclosure must conform to the requirements of AQIS for the commodity and country of origin as found in the ICON database.	See www.aqis.gov.au/icon	To calculate the dosage (weight) of methyl bromide to be introduced into the fumigation enclosure, the following formula must be applied: D = V x C Where: D = Dosage (in grams); V = Volume (in cubic metres); C = Required concentration (in grams per cubic metre).
6.2.2 Compensation must be applied to the dosage for fumigant mixtures containing less than 100% methyl bromide.		To calculate compensation for a mixture of 98% methyl bromide and 2% chloropicrin the following formula applies: D = (V x C) ÷ 0.98
6.2.3 Compensation must be applied for temperatures below 21° C.	See 1.5 Temperature.	

MANDATORY		INFORMATIVE
PERFORMING THE FUMIGATION		
7.1 Using a vaporiser		
7.1.1 A vaporiser must be used for all fumigations conducted for quarantine purposes.	Methyl bromide must be applied to the fumigation enclosure in gaseous form. This must be achieved in all circumstances by applying the liquid fumigant through a vaporiser (HOT GASSING) in order to fully volatilise the fumigant prior to its entry into the fumigation enclosure. See APPENDIX 10: Vaporisers for methyl bromide.	In warm or hot climates, ambient temperatures cannot be relied on to adequately vaporise liquid methyl bromide during the gassing process. The water in the vaporiser unit should be raised to boiling point before any liquid methyl bromide is released into it. The water should be maintained at this temperature for as long as possible throughout the gas introduction process and should not be allowed to fall below 65 ºC to ensure complete vaporisation of the methyl bromide (and chloropicrin if present). The temperature can be monitored during the gas introduction process by holding the gas supply pipe from the vaporiser to the fumigation enclosure. The pipe should feel warm/hot throughout the period in which the gas is introduced. If the temperature of the pipe reduces significantly, either stop the introduction of the fumigant and allow the water in the vaporiser to re-boil, or slow the flow of the fumigant from the cylinder to the vaporiser. Complete fumigant vaporisation will allow more effective distribution and penetration of the fumigant, and will reduce the possibility of product damage and pest survival.

MANDATORY		INFORMATIVE
7.2 Distributing fumigant within the enclosure		
7.2.1 Fans must be operating during the application of the fumigant to ensure even distribution within the enclosure. **7.2.2 Effective distribution of methyl bromide must be determined by monitoring gas concentrations at all monitoring points at set times after the introduction of the gas.**		If all concentration levels cannot be achieved **within 15% of the lowest reading (equilibrium)** the fumigant should be redistributed by turning on the fan for a further period of time. Concentrations should then be measured to see if equilibrium has been reached. **This process should be continued until either equilibrium is reached or when the levels drop below the standard.** The fumigation cannot start if the fumigant levels drop below the standard concentration (A) as displayed in APPENDIX 11: Methyl Bromide Fumigation Ready Reckoner. If the cause can be identified and rectified without removing the sheet or losing excessive fumigant from the enclosure, the enclosure may be re-dosed and the fumigation process continued.
7.3 Checking for leaks		
7.3.1 The fumigation enclosure and all application equipment must be free from leaks.	Checking for leaks must be carried out during the fumigant introduction process and after all the fumigant has been applied to the enclosure at the start of fumigation.	A small amount of fumigant should be released through the system prior to the release of the total dose. All joins and connections should be checked for leakage and corrective action taken, if required.

MANDATORY	INFORMATIVE
MONITORING AND MAINTAINING FUMIGANT CONCENTRATIONS	
8.1 Monitoring frequency	
8.1.1 Methyl bromide concentrations within the fumigation enclosure must be measured on at least two occasions during the fumigation exposure period; at the start of the fumigation exposure period and at the end of the fumigation exposure period.	**NOTE** **The fumigation period begins when all the readings are at or above the standard concentration and equilibrium has been reached.**
8.1.2 All instruments used for measuring and monitoring methyl bromide concentrations must be fit for the purpose, in good working order and calibrated on a regular basis according to manufacturer's instructions.	**Specifications for monitoring equipment** Monitoring equipment requires regular calibration and maintenance to ensure it operates effectively. It is particularly important to maintain carbon dioxide and moisture absorbers fitted to instruments (if applicable). Where batteries are used, they should be checked regularly for working condition.
8.1.3 All instruments used for measuring and monitoring methyl bromide concentrations within a fumigation enclosure must be fitted with a moisture absorption filter, an appropriate carbon dioxide (CO_2), or other filter, as required by the manufacturer.	Any monitoring equipment may be used providing it is capable of reliably measuring methyl bromide concentrations within the fumigation enclosure of between 2 – 100 g/m³ . However, it should be noted that the dosage required for some treatments will result in methyl bromide concentrations in excess of 100 g/m³ during the initial stages of the treatment.

8.2 Fumigant levels – Start-point and End-point

MANDATORY

8.2.1 Fumigant concentrations must be measured at the start and end of the fumigation exposure period.

Fumigant concentrations must be measured at:

1. Start-point monitoring
The fumigation exposure period begins when the methyl bromide concentrations at all monitoring points are AT OR ABOVE THE STANDARD and have reached EQUILIBRIUM (when all readings are within 15% of the lowest reading).

2. End-point monitoring
Methyl bromide concentrations at all monitoring points must be AT OR ABOVE THE STANDARD at the end of the fumigation period, before fumigation can be declared successful.

See APPENDIX 11: Methyl Bromide Fumigation Ready Reckoner.

INFORMATIVE

TABLE 2 : MONITORING TIMES

Exposure period	Start-point monitoring	Mid-point monitoring	End-point monitoring
Less than 48 hours	*Take the first readings once it is reasonable to expect that equilibrium has been achieved.**	*Not required but may be undertaken*	*End of exposure period*
48 hours or more	*Take the first readings once it is reasonable to expect that equilibrium has been achieved.**	*24 hours after start and as required.*	*End of exposure period*

* Equilibrium can be achieved quicker if:

- There is good free air space in the enclosure
- The are sufficient fans and they are positioned to best effect
- The methyl bromide is applied as a hot gas.

8.3 Fumigant concentrations

MANDATORY		INFORMATIVE
8.3.1 Fumigant concentrations must be at or above the standard concentration (A) at all times, as set out in the Ready Reckoner.	See Appendix 11 Methyl Bromide Ready Reckoner Some quarantine treatments require a higher retention rate than what is specified in this Standard. In such cases the higher retention rate is the end-point concentration that must be achieved for a successful fumigation. This is most common for fumigations of perishable commodities where there is a short exposure time.	The concentrations presented in the ready reckoner are based on the required percentage retention in the following table:

TABLE 3:
STANDARD CONCENTRATIONS REQUIRED AT SPECIFIC MONITORING TIMES

Monitoring times	*Concentration of original fumigant required*
0.5 hours	*75% or more*
1 hours	*70% or more*
2 hours	*60% or more*
4 hours	*50% or more*
12 hours	*35% or more*
24 hours	*30% or more*
48 hours	*25% or more*

See APPENDIX 11: Methyl Bromide Fumigation Ready Reckoner.

MANDATORY	INFORMATIVE
8.3.2 Fumigant concentrations at all monitoring points must be within 15% of the lowest concentration at the start of the fumigation exposure period.	If readings from the monitoring points are NOT within 15% of the lowest reading at start point, there may be a problem with: • Inadequate fumigant distribution throughout the enclosure. • Blockages in the monitoring tubes or other monitoring problems. • Monitoring equipment (malfunction). Where the problem is identified as inadequate fumigant distribution, the fan(s) should be turned on and run for a further period of 15-30 minutes and the readings retaken. If fumigant levels are below the required standard concentrations at any time during the fumigation exposure period, in addition to the possible causes listed above, there may be a problem with: • Fumigation sheets or fumigation floor. • Gas-tight seals between sheets and floor. • Highly sorptive commodity. • Incorrect dosage. If the cause can be identified and rectified without removing the sheet or losing excessive fumigant from the enclosure, the fumigation can continue as normal so long as concentrations are equal to or above the standard concentrations (A) as set out in the Ready Reckoner. See Appendix 11 Methyl Bromide Fumigation Ready Reckoner. Additional fumigant may need to be added to top-up the concentration to a satisfactory level. Where the cause cannot be readily identified (particularly in smaller fumigation enclosures, such as containers) fumigation should be stopped and the fumigant ventilated from the enclosure. Once the area is safe (free of fumigant at levels hazardous to humans) the commodities and the enclosure should be inspected for possible causes.

MANDATORY		INFORMATIVE
8.4 Topping-up		
8.4.1 Topping-up must only be undertaken when fumigant concentrations are above the minimum top-up level at all monitoring points. **8.4.2 Topping-up is not an option for fumigations of less than 12 hours**.	When topping-up is done after the end point monitoring the exposure period must be extended for a further 4 hours and final monitoring readings must be taken and recorded. The top-up dosage must be applied in accordance with Section 7: Performing the fumigation. Topping-up is not an acceptable action solely to compensate for inadequate operational practices e.g. use of torn or unsuitable fumigation sheets. Topping-up must only be undertaken when fumigant concentrations are above the minimum concentration to allow top-up (B) at all monitoring points. Fumigant levels must not be topped-up above the maximum top-up concentration (C). In addition to the monitoring times in TABLE 2 monitoring must take place at intervals not greater than 6 hours apart throughout the fumigation period if it is suspected that the relevant final concentration will not be achieved. Monitoring at the set times must still be done.	There are two options available for topping-up methyl bromide: Option 1 - Top-up – Start-point and End-point monitoring with top-up option at the end. This option allows for topping-up the level of methyl bromide at the end of the fumigation period, but only in certain circumstances and only if fumigant concentration levels have been monitored according to TABLE 3. If the fumigant concentration falls below the *standard concentration* (A) but not below the *minimum concentration* (C) indicated in APPENDIX 11: Methyl Bromide Fumigation Ready Reckoner. The fumigant levels may be topped up to not more than the *maximum top-up concentration* (B). Option 2 - Top-up – Continuous monitoring with top-up options. This option should be used when highly sorptive commodities have to be fumigated and the need for a top-up is indicated. Commodities considered to be highly sorptive to methyl bromide include: Fish Meals; Bone Meals; Corn Meals; Nuts; Seeds; Fats; Coffee Beans and commodities packed in polystyrene material. See APPENDIX 12: Examples of 'Top-up' calculations.

MANDATORY	INFORMATIVE
COMPLETING THE FUMIGATION	
9.1 Ventilation	
9.1.1 On completion of a fumigation treatment, the methyl bromide must be vented out of the fumigation container.	**Ventilation of fumigation enclosures** This can be done by either natural aeration or forced ventilation using fans or other appropriate equipment. The time taken to reach the TLV (5 ppm in Australia) may take longer than 48 hours, particularly when: • Commodities are fumigated in 40 ft (12.2 m) containers; • Commodities are tightly packed or sorptive; • Free airspace around the commodity is less than a total of 350 mm. Before measuring TLV, the fumigator should switch off all fans being used for aeration of the fumigation enclosure. Where containers have been sheeted, the sheet must be fully removed prior to testing for TLV. Where containers have been fumigated, fumigant concentrations should be sampled from one or more representative points from within the fumigation enclosure. After taking the samples the fumigator will close the enclosure and leave the risk area. After 30 minutes of ventilation, the fumigator should reopen the enclosure and check the fumigant concentration inside the enclosure. If the concentration is less than or equal to 5 ppm, the enclosure may be declared safe. If concentrations of fumigant above 5 ppm are detected, the fumigator should leave the risk area, re-ventilate using fans or naturally ventilate the enclosure for a further period of time and recommence the TLV check procedure. This process should be repeated until all sections of the fumigation enclosure have been proved safe for re-entry.
9.1.2 Ventilation of the enclosure must be conducted so that the workplace Threshold Limit Value (TLV) for methyl bromide is not exceeded outside of the risk area.	If there is the likelihood of exceeding the TLV, then the risk area must be extended beyond the recommended distance for the duration of the ventilation.
	Note Commodities that have not been adequately ventilated threaten the health of people packing and inspecting fumigated commodities. A notice may be placed on the container stating: “Due to possible desorption of fumigant from the commodities within this container, further ventilation may be necessary before the container is entered and the commodities removed”

MANDATORY		INFORMATIVE
9.1 Continued		
9.1.3 At the end of the fumigation exposure period, concentrations of methyl bromide in the fumigation enclosure, the air spaces of the treated commodity and the surrounding area must fall below the TLV.	Before any unprotected personnel are allowed access to a fumigation enclosure and 'risk area' it must be declared free from hazardous levels of fumigant (at or below TLV). Before a fumigated container or commodity is released from the control of the fumigator, it must be declared free from hazardous levels of fumigant (at or below TLV) in air spaces of the commodity or packing material enclosing the commodity.	Where there is no documentation showing that an enclosure or container has been ventilated, handlers should treat it as still 'under gas' until it can be declared safe.
9.1.4 The equipment used for measuring methyl bromide concentrations in 'risk areas' and post treatment clearance of enclosures must be fit for the purpose and capable of detecting concentrations of between 1 – 100 ppm v/v.	Leak detection equipment must not be used for this purpose.	
9.2 Certification		
9.2.1 For offshore fumigations, fumigation providers must issue a certificate indicating the fumigation was successful and conformed to the AQIS standard. To support the claims made on the fumigation certificate, a Record of Fumigation sheet must also be completed on site and retained for audit purposes.		See APPENDIX 4: Example of a record of fumigation. See APPENDIX 5: Example of a fumigation certificate.

APPENDIX 1: Fumigation of Perishable Commodities

In addition to the requirements described in the Methyl Bromide Fumigation Standard, perishable commodities fumigated to ICON and PHYTO database requirements must meet the following:

<table>
<tr><th colspan="2">FRESH FRUIT AND VEGETABLES, NURSERY STOCK AND FRESH CUT FLOWERS</th></tr>
<tr><th>MANDATORY</th><th>INFORMATIVE</th></tr>
<tr><td colspan="2">1. General conditions</td></tr>
<tr><td>1.1 Impervious wrappings or bags without perforations must be removed or opened.

1.2 The consignment must be prepared and stacked to allow effective fumigant circulation.

1.3 Cartons, boxes and other receptacles used to transport fumigated perishable goods must also be fumigated.

See Sections 6.1 and Section 6.2 of the Standard

See Section 8.3 of the Standard</td><td>If the plants are to remain in their original boxes or other packages, or are placed in other packages for fumigation, ensure that there is adequate ventilation by cutting holes or making numerous gaps in all sides of the packages.

The AQIS Wrapping and Perforation Standard

To meet AQIS perforation requirements for fumigation impervious materials must contain not less than four (4) perforations of 6 mm diameter / 100 cm^2 (10 cm x 10 cm square) or five (5) perforations of 5 mm diameter / 100 cm^2. Plastic wraps containing numerous pinholes (at least 6 holes / cm^2), frequently used for transportation of fruit and vegetables are also acceptable.

NOTE

Methyl bromide concentrations may decline below an effective level when methyl bromide is used to treat commodities packed in polystyrene boxes.</td></tr>
</table>

MANDATORY		INFORMATIVE
2. Fresh fruit and vegetables		
2.1 The temperature of the fruit pulp must be measured for dose calculations, not the minimum ambient temperature. **2.2 The lowest temperature recorded must be the temperature used to calculate the dose of methyl bromide for treatment purposes.** **2.3 A carbon dioxide absorption tube or filter must be used in addition to a moisture absorption tube in specific circumstances.**	The temperature must be measured by placing the temperature probe into the centre of a piece of fruit located in the middle of a carton. At least three temperature readings must be taken from fruit in three different cartons/pallets and from different varieties within the consignment: • From one carton at the top of the pallet; • From one carton in the middle of the pallet; • From one carton at the bottom of the pallet.	Some commodities require specific minimum temperatures, e.g. New Zealand strawberries 18 °C. Where appropriate, the commodity may be warmed to meet the minimum temperature requirement. Some perishable commodities (e.g. garlic and onions) release high amounts of carbon dioxide and this affects gas measurements of some instruments. It is particularly important to maintain the carbon dioxide and moisture absorbers fitted to instruments. Where batteries are used, they should be checked for working condition.

MANDATORY		INFORMATIVE
3. Nursery stock and fresh cut flowers		
3.1 Pure methyl bromide must be used for nursery stock and fresh cut flowers.	Chloropicrin is phytotoxic and must not be used.	Plants may be covered with single sheets of damp newspaper so that the gas is not circulated directly on to them.
3.2 Fumigation of nursery stock and fresh flowers must not be conducted below 11 °C or above 30 °C.	See Section 1.5 of the Standard.	The fumigation of plants above 30 °C should be avoided as plants may become stressed or damaged. Plants should not be wet, but roots should be moist to prevent damage.
3.3 Plants that have been refrigerated or stored in a cool room must be brought up to ambient temperature of the enclosure prior to the introduction of methyl bromide.		Low humidity during treatment may damage plants. Relative humidity in the fumigation enclosure should be held above 75% during fumigation. In the absence of water misters within the fumigation chamber, damp newspapers and shallow trays of water may also be placed on the floor of the fumigation chamber to help prevent plant desiccation.
3.4 Fans must be used to disperse the fumigant throughout the enclosure.	See Section 5.3 of the Standard.	Excessive air currents during fumigation or the post-treatment aeration period aggravate injury. It is recommend that circulating and ventilating fans or blowers be operated for the minimum length of time required for distributing the fumigant evenly or for removing toxic concentrations after treatment.
3.5 Where the lids of cardboard boxes are not sufficiently vented, the boxes must be opened and stacked to allow adequate gas circulation.		Alternatively, flowers can be removed from the cartons and placed upright in the fumigation enclosure. Some flowers, for example roses, may be imported with cardboard collars or plastic sleeves to prevent bruising during transport. These may be retracted or removed to allow effective gas circulation.

MANDATORY	INFORMATIVE
4. Post fumigation	
4.1 Fumigated plants must not be packed into plastic boxes or boxes lined with plastic.	The original packing material may be used as long as it has been fumigated also.

APPENDIX 2: Fumigation of vessels with methyl bromide

Application
In addition to the requirements outlined in the AQIS Methyl Bromide Standard and ICON, the Yacht appendix is intended for the fumigation of vessels that can be sheeted or sealed for fumigation. See 4.2 Using gas tight containers as fumigation enclosures and 4.3 Pressure testing requirements for un-sheeted containers of the Standard.

THESE REQUIREMENTS APPLY TO VESSELS UNDER TWENTY FIVE (25) METRES IN LENGTH AND MAY BE APPLIED TO LARGER NON-COMMERCIAL VESSELS THAT CAN BE EFFECTIVELY SEALED. IT IS NOT INTENDED TO BE APPLIED TO THE FUMIGATION OF CARGO VESSELS.

MANDATORY		INFORMATIVE
1. PRIOR TO FUMIGATION		
1.1 An assessment must be made to determine if the vessel can be effectively fumigated.	Timber components must not be covered or coated. See Section 3.2 of the Standard.	
1.2 Due to the complex nature of vessel fumigations, a written plan for each fumigation must be submitted to AQIS for approval before fumigation commences.	The fumigator must visit the vessel to assess how it will be prepared and fumigated. The written plan must contain the following information: • Location of fumigation site • How the vessel will be sealed/sheeted • If the vessel is to be sealed, how it will be pressure tested • The number and locations of fumigant supply pipes • The number and location of fans • The number and location of monitoring tubes • The calculation of fumigant to be used and enclosure volume. See Section 6.1 of the Standard.	The plan can be presented as a diagram with locations of supply pipes, fans and monitoring tubes clearly indicated. The diagram does not have to be to scale, but needs to be legible and should indicate the fumigant enclosure volume accounting for volume reductions for any added fittings etc. Yacht dimensions are usually provided in the owner's manual.

2. FUMIGATION PROCEDURE		
2.1 The fumigation site must be secured and a safety risk assessment must be undertaken.	If the vessel is to be fumigated on water, a 'risk area' must be set up around the fumigation enclosure or moored vessel (3 metres if achievable) with warning signs visible from all sides of the vessel. See Section 5.4 of the Standard. Only authorised personnel are allowed within the risk area. The area must be cleared of any unprotected personnel, that is, personnel not wearing a respirator, and at no time during the fumigation should unprotected personnel be allowed to enter the risk area.	Proximity to other vessels should be taken into consideration when fumigating. If the vessel to be fumigated is moored on a public jetty security personnel may be required. Permission to fumigate may be required from the relevant: 1. Harbour master 2. Marina/Jetty 3. Council 4. Waterways For containerised, dry dock, patent slip or flat rack fumigations refer to Section 2.1 and Section 2.2 of the Standard.
2.2 If the vessel is to be fumigated on water, weather conditions, such as sea and wind conditions for the following 24 hours must be taken into account.		If the vessel is to be fumigated on a flat rack, refer to Section 2.1 and Section 2.2 of the Standard. The weather conditions should be determined by checking with the Bureau of Meteorology to obtain the forecast applicable to the area where the fumigation will be performed.

MANDATORY		INFORMATIVE
2. CONTINUED		
2.3 If fumigating on water the sheeting of a vessel must be weighted and extend below the water to ensure an air tight seal (the sheet must be secure enough not to be affected by sea conditions).		It is preferable to sheet the entire vessel/container as per Section 4.1 of the Standard. Multiple vessels/containers may be fumigated under a single gas proof sheet. If the sheet is unable to enclose the mast or superstructure, a seal must be secured to prevent gas leakage Regardless of whether a vessel is sealed, containerized, individually sheeted or part of a multi-vessel fumigation, the fumigant supply pipe, fan and monitoring tube requirements in Section 5.1, Section 5.2 and Section 5.3 of the Standard apply.
2.4 If a vessel cannot be entirely sheeted, all windows, doors, hatches, ventilation points, entry/exit points, etc. must be made gas tight.	Prior to every treatment, any items used for sealing the vessel must be visually inspected for tears, holes and abrasions, as these are a major contributing factor to significant gas loss. The entry/exit points for gas supply pipes and monitoring tubes must be made gas tight. The cabin or area to be treated must be sealed with tape. Any bung holes need to be sealed and all foam rubber, beds, etc. must be removed.	Water proof does not necessarily mean gas tight.
2.5 Sealed vessels must be pressure tested.	See Section 4.2 and Section 4.3 of the Standard.	See Appendix 6: Pressure testing enclosures for gas tightness of the Standard.
2.6 The vessel's volume must be determined so that the correct amount of fumigant can be applied.		

MANDATORY		INFORMATIVE
2. Continued		
2.7 Fumigant supply pipes must be positioned to allow fumigant to be introduced and circulated effectively throughout the vessel.	See Section 5.2 of the Standard. **Minimum requirements** for single storey vessels: • **One pipe** per vessel less than 15 metres in length. The line should be centrally located (e.g. mid-ship). • **Two pipes** per vessel greater than 15 metres in length. One line should be placed forward and one aft. **Minimum requirements** for multi-storey vessels: • **One pipe per storey** for vessels less than 15 metres in length. With due regard for internal lay out, the line should be centrally located (e.g. mid-ship). • **Two pipes per storey** for vessels greater than 15 metres in length. With due regard for internal lay out, one line should be placed forward and one aft.	The size and design of a vessel will determine the number of fumigant supply pipes needed for effective fumigation. **Single storey vessels:** Single storey vessels are those with one accommodation deck with under-floor compartments that have a shared air space and a simple weather deck. Vessels with a distinct separate but simple wheelhouse on the upper deck could be treated as a single storey vessel. Vessels with one accommodation deck, but segregated by waterproof bulkheads broken into distinct spaces, may need to be treated separately. **Multi-storey vessels:** Multi-storey vessels are those that have separate floors/levels, including inhabitable levels. Vessels with a single storey that have storage and bilge areas under the floor should be treated as a single-storey vessel. Complex or unusual vessels will often have distinct sealed bulkheads and storage compartments (for example: patrol boats, fishing vessels and pack ice vessels). When fumigating these types of vessels, these requirements should be taken into account to determine fumigant supply pipe numbers and placement. In some cases, there will need to be a fan, a supply pipe and a monitoring tube in each separate compartment.
2.8 Where multiple fumigant supply pipes are used, the entire system must be balanced in order to achieve even distribution throughout the enclosure.	In order to balance the system, each arm of the system must consist of fumigant supply pipes that are equal in total length and diameter.	

MANDATORY		INFORMATIVE
2. Continued		
2.9 Fans must always be used in vessel fumigations.	There must be enough fans situated in appropriate locations throughout the vessel, with enough capacity to adequately and evenly distribute the fumigant. Fans are required for at least the first 30 minutes of the fumigation or until equilibrium and initial dose concentrations have been reached. See Section 5.3 and Section 7.2 of the Standard. **Minimum requirements** are: **Single storey vessels:** • **One fan** per vessel for small single cabin area vessels (e.g. cabin cruisers). The fan must be located adjacent to an injection line. • **Two fans** per vessel between 15 – 30 metres in length. One fan must be placed forward and one aft. • **Three fans** per vessel greater than 30 metres in length. One fan must be placed forward, one mid-ship and one aft. **Multi-storey vessels:** • **Two fans per storey**. One fan must be placed forward and one aft.	Fans should run sequentially to assist with the movement of the fumigant from areas where it has been introduced to areas where no fumigant supply pipe is present. All doors and compartments should be opened to allow fans to be effective. High velocity and high volume fans should not run for longer than 15 - 20 minutes after the introduction of the fumigant, as they may force the fumigant out of the enclosure. The size and design of a vessel will determine the number of fans needed.

MANDATORY		INFORMATIVE
2. Continued		
2.10 Vessels must have a minimum of three monitoring tubes per storey/level.	For fumigation under sheet, an additional monitoring tube must be placed outside the vessel, between the vessel and the sheet.	The size and design of a vessel will determine the number of monitoring tubes.
2.11 Inside the vessel, all monitoring tubes must be located at least 2 metres away from any fumigant supply pipes.	**Minimum requirements** are: **Single storey vessels:** Three tubes per vessel. Each vessel must have one tube placed as follows: • Ceiling level forward • Mid-ship around 1.5 metres above the floor. • At or below floor level aft. **For vessels greater than 30 metres in length, four monitoring tubes are required.** These are to be situated as above, with the additional placed mid-ship – one in a cabin and one in a corridor, both around 1.5 metres above the floor. **Multi-storey vessels:** Three monitoring tubes **per storey**. Each storey must have one tube placed as follows: • Ceiling level forward • Mid-ship around 1.5 metres above the floor • Below floor level aft (If it is not possible to place the tube below floor level it must be placed at floor level).	

MANDATORY		INFORMATIVE
2. Continued		
2.12 Dosage and Temperature	See Section 1.4 of the Standard. See Section 1.5 of the Standard. See Section 6.2 of the Standard. See Section 8.3 of the Standard. See Section 8.4 of the Standard.	
2.13 Monitoring	See Section 7.3 of the Standard. See Section 8.1 of the Standard.	
2.14 Ventilation	See Section 9.1 of the Standard.	

APPENDIX 3: Commodities for which problems may occur when fumigated with methyl bromide

Commodity	Notes
1. Foodstuffs: a. Butter, lard and fats; b. Iodised salt stabilised with sodium hyposulphite; c. Full fat soybean flour, whole wheat flour, other high protein flours and baking powders; d. Nuts with high oil content; e. Certain baking sodas, cattle licks, salt blocks, or other foodstuffs containing reactive sulphur compounds; f. Bone meal.	Never exceed the recommended dosage or exposure periods for food or foodstuff commodities. Foods imported into Australia or manufactured in Australia must comply with the Food Standards Code www.foodstandards.gov.au.
2. Leather Goods	Particularly kid or other leather goods tanned with sulphur processes.
3. Woollens	Extreme caution should be used in the fumigation of Angora woollens. Some adverse effects have been noted on woollen socks, sweaters, shawls and yarn.
4. Viscose rayon	Rayons processed or manufactured with the use of carbon bisulfide.
5. Photographic chemicals	Excluding camera film or X-ray film.
6. Paper: a. Silver polishing papers; b. Certain writing and other papers cured by sulphide processes; c. Photographic prints; d. “Carbonless” carbon paper; e. Blueprint papers.	
7. Rubber Goods: a. Sponge rubber; b. Foam rubber, such as rug padding, pillows, cushions, mattresses, and some car seals; c. Rubber stamps and other similar forms of reclaimed rubber.	
8. Vinyl	
9. Furs	
10. Feathers	Especially in feather pillows.
11. Rug Padding	e.g. foam rubber, felts, etc.
12. Charcoal, cinder blocks and activated carbon	
13. Horsehair articles	
14. Oil artworks	
15. Sulphur-based paint	
16. Cellophane	
17. Polystyrene packaging and containers	Polystyrene can absorb large quantities of methyl bromide, which may take a long time to desorb.

APPENDIX 4: Example of a record of fumigation

Methyl Bromide - Record of Fumigation

Job Details

Job Identification	Customer Name	Start Date of Fumigation	Location

Description of Consignment

Target of Fumigation	Container Numbers / Consignment Identification

Fumigation Details

The consignment complies with the following requirements of the *Standard*:

Adequate free airspace, no impervious surfaces or wrapping, maximum timber thickness & spacing ☐ Yes ☐ No

☐ Sheeted Containers Size: Qty:	☐ Sheeted Stack	Enclosure Dimensions L H W
☐ Pressure Tested Container Decay Time = seconds	☐ Chamber	Volume = m^3

Specified Dose Rate	Exposure Period	Forecast Minimum Temp	Dose Rate Used
g/m^3	hrs	°C	g/m^3
Calculated Dose	Chloropicrin ☐ N/A	Actual dose applied	Time dosing finished
g	% g	g	

Concentration Readings

Phase	Time of Reading	Standard g/m^3	Monitor Line Readings by Location 1:	2:	3:	4:	5:	Equilibrium Calculation	Top-up Dose
Start								%	
								%	
During									
End									

Comments

Ventilation

Initial TLV	Date & Time Taken	2nd TLV Reading	Date & Time Taken
ppm		ppm	

Fumigator in Charge		Quarantine Officer (if supervised)	
Name	Signature	Name	Signature

For a copy go to http://www.daff.gov.au/aqis/import/general-info/qtfp/treatments-fumigants

APPENDIX 5: Example of a fumigation certificate

Error! Objects cannot be created from editing field codes.

For a copy go to http://www.daff.gov.au/aqis/import/general-info/qtfp/treatments-fumigants

How to complete the AFAS Approved Standard Fumigation Certificate

Details of the consignment and information relating to the fumigation must be included on the fumigation certificate for it to be accepted by AQIS. This information should be on a single page and in a format consistent with the above template. Following is advice on completing this fumigation certificate template.

Only fumigation certificates from AFAS countries issued by a treatment provider on the AFAS Acceptable Treatment Providers list will be accepted by AQIS.

Certificate must be on the treatment provider's letterhead

The letterhead must include the address of the fumigation treatment provider that matches the address published on the AQIS treatment providers list (TPL). Where a company has more than one branch the address on the letterhead must match that on the TPL for the branch that issues the certificate.

Certificate Number / AFAS Registration Number

Each certificate must include a unique certificate number issued by the treatment provider and the treatment provider's AFAS Registration Number. For audit and investigation purposes the certificate number must link to the treatment provider's fumigation records for the treatment covered by the certificate.

Target of the Fumigation Details

Select the option that best describes the target of the fumigation. This may be the commodity (goods), the packaging (including pallets and/or container) or both.

Consignment Link

The certificate must include a link to some other official documentation related to the consignment such as: a bill of lading number, a commercial invoice number, a preferential tariff certificate number, a packing list number, a letter of credit number or container number. If there is insufficient room on the certificate you may use the additional declarations field or attach a complete list to the certificate.

Consignment Details

The certificate must also include the quantity, the country of origin, the intended port of loading and country of destination as well as the name and addresses of the exporter and importer.

Treatment Details

- Date fumigation completed: is the date on which the fumigation exposure period is complete.
- Place of fumigation: is the general location in which the fumigation took place, e.g. Town / City.
- AQIS prescribed dose rate (g/m^3): is the AQIS prescribed concentration of methyl bromide (MBr) required to effectively treat the target of the fumigation.
- Exposure period (hrs): is the AQIS prescribed duration of the fumigation.
- Forecast minimum temperature (°C): is the minimum temperature in degrees Celsius forecast by an official source for the period of fumigation.
- Applied dose rate (g/m^3): is the concentration of MBr applied to the fumigation enclosure including adjustments made to the AQIS prescribed dosage to compensate for forecast minimum temperatures between 21°C and 10°C.
- How was the fumigation conducted: Select the fumigation enclosure type and include container number/s if the treatment was conducted in the container/s the target of the fumigation will be shipped in.
- Does the target of the fumigation conform to the AQIS plastic wrapping, impervious surface and timber thickness requirements at the time of fumigation? This declaration identifies that at the time of fumigation all AQIS plastic wrapping, impervious surface and timber thickness requirements have been met. If there is no plastic wrapping or impervious surfaces on the target of fumigation, the fumigator should answer 'yes' as all plastic wrapping and impervious surface requirements are met. Where there requirements are not met the fumigation should not be conducted.
- Ventilation, final TLV reading (ppm): The final threshold limit value (TLV) reading is when the methyl bromide concentration within the enclosure falls to 5 ppm or below. Record the MBr concentration reading to declare the enclosure is gas free. Where multiple containers are fumigated in one enclosure, TLV is required for each container. Where a stack or permanent chamber fumigation is performed, answer 'NA' (not applicable) as no TLV is required.

Declaration

The AFAS accredited fumigator (or accredited officer if the certificate is endorsed by the relevant regulatory authority) responsible for ensuring that the treatment is effective and performed according to the requirements of the AQIS Methyl Bromide Fumigation Standard must sign and date the certificate and print their name and accreditation number. They may also wish to stamp the certificate with their company stamp.

Additional Information

Any additional information that the fumigator wishes to supply may be included in the Additional Declarations field.

False declarations may result in AFAS accreditation being revoked.

APPENDIX 6: Pressure testing enclosures for gas-tightness

All fumigations must be conducted in gas-tight enclosures. Where it is not intended to enclose the commodity in gas-proof sheets, the gas-tightness of the enclosure must be determined prior to the introduction of any fumigant.

Inspection of empty containers

If a container can be selected prior to packing, the procedure below should be followed.

The container should be positioned to allow easy access to all four sides and the roof. It should stand on a flat, horizontal surface to avoid twisting (or racking) that may prevent the doors from providing an adequate seal.

The container should be examined before pressure testing to ensure it is structurally sound, the sides and roof are free of significant holes, and free of obvious distortion. Containers that are obviously damaged (e.g. where large holes and gaps are present in the roof and walls, or where the doors, door seals and locks do not fit and function properly) are not suitable and should not be pressure tested.

Where rust is present, the affected areas should be closely inspected and checked for the presence of holes. Containers with holes, gaps or those that are badly rusted are not suitable for pressure testing. The doors must make firm contact with each other, the doorframe and floor sill so that their seals function effectively. The rubber seals around the doors should be unbroken, leaving no obvious gaps. Containers with faulty doors and door seals are unsuitable for pressure testing.

The interior of the container should be examined from inside, with the doors closed so that any gaps or holes should be visible as they will allow light to enter the container. Containers with any holes and gaps are unsuitable for pressure testing.

Containers with:

- Wet or damaged floors are not suitable for pressure testing;
- Dry floors that are in good condition showing no signs of damage are suitable for pressure testing.

Closing the ventilators

All ventilators must be sealed on the outside of the container – **not the inside.**

Make sure the area around each ventilator is dry and free from grease, then completely cover and seal all ventilators to make them gas-tight. The most effective way to seal ventilators is to completely cover them with plastic duct tape.

It is important to unseal all ventilators at the end of the exposure period – and always before the container is loaded onto any form of transport.

Pressurising the container

This should be done without drilling holes through the walls of the container.

AQIS recommends a ‘finger manifold’ be used for pressure testing.

The finger manifold is designed to deliver high pressure compressed air into a container, rapidly pressurise it and then allow the pressure decay time to be measured. The manifold has twelve ‘fingers’, nine of which deliver compressed air into the container while the other three measure the pressure within the container. The ‘fingers’ are made of soft copper tubing that can be bent to shape as necessary.

The manifold is bent to fit over the front of the sill so that it can be sealed between the right hand door and the sill, and removed after the pressure test has been completed.

Instruments for measuring the pressure decay time

The pressure inside the container can be measured using a variety of instruments. The equipment required ranges from relatively simple to proprietary instruments including:

- A simple U tube manometer or an inclined manometer, using a manually operated stop watch;
- Any sensitive pressure gauge, using a manually operated stop watch;
- A purpose made instrument, the CONTESTOR, which combines a pressure sensor with a timer that cuts in when the required pressures have been achieved.

Procedure for pressure testing

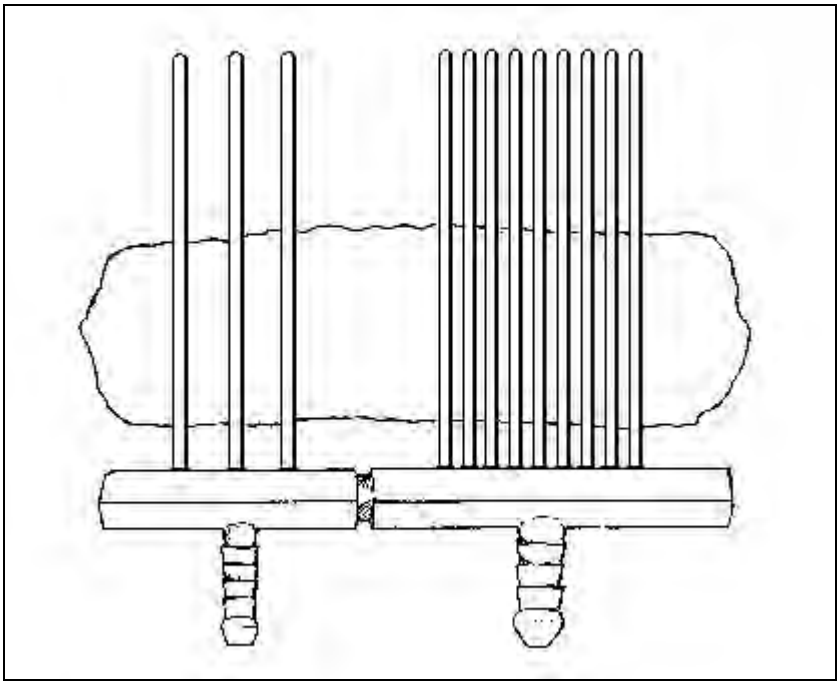
Make sure the area around the container ventilator is dry and free from grease, then completely cover and seal all ventilators to make them gas-tight.

The pressure inside the closed container must be raised to 250 Pa using high-pressure compressed air supplied from a portable compressor or gas cylinders.

1) As the pressure inside the container reaches 250 Pa, turn off the compressed air supply.
2) Allow the pressure to decay to 200 Pa.
3) Start measuring the time (in seconds) when it reaches 200 Pa.
4) Stop measuring the time (in seconds) when it reaches 100 Pa.
5) Record the pressure decay time.

NOTE
AQIS considers containers that give a pressure decay time from 200 to 100 Pascals of 10 seconds or more to be gas-tight. Such containers may be fumigated with methyl bromide without enclosing them under gas proof sheets. Where the pressure decay time does not meet the minimum requirements, the container must be enclosed in gas proof sheets.

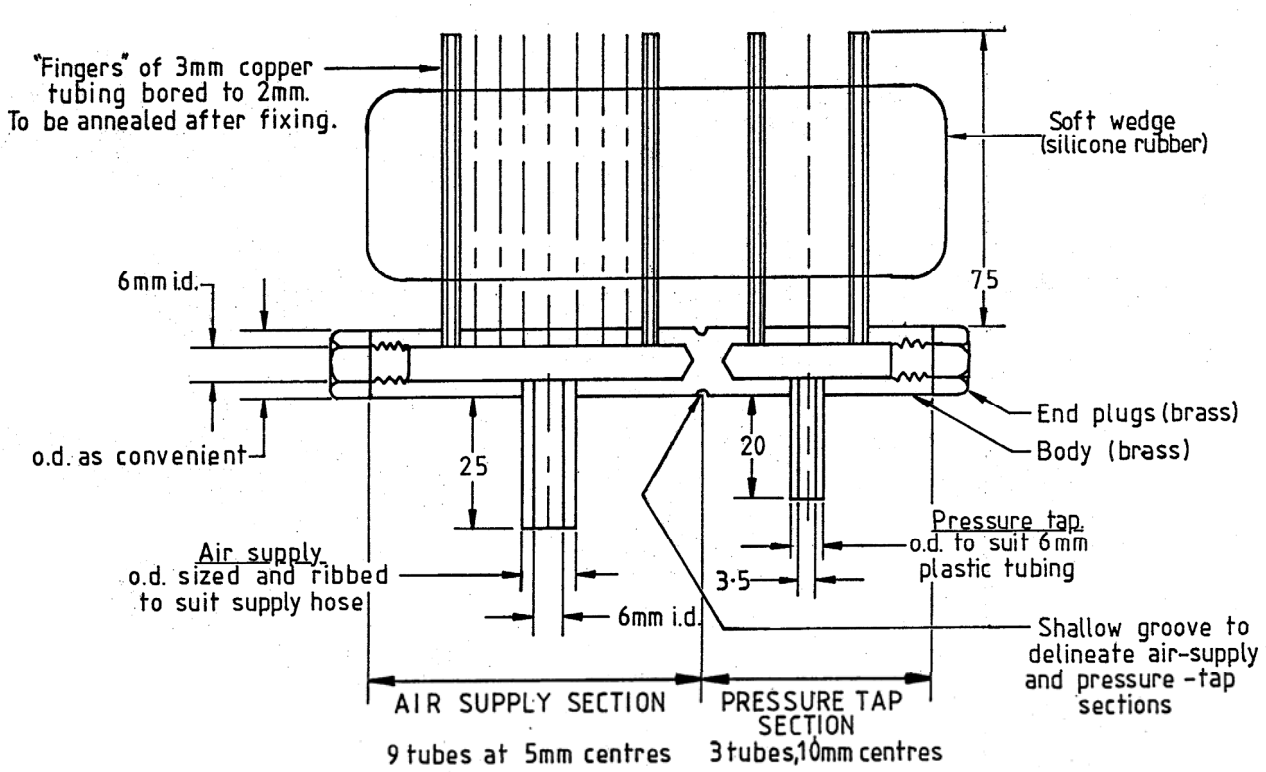
FIGURE 1 –FINGER MANIFOLD FOR DELIVERING HIGH PRESSURE COMPRESSED AIR INTO A CONTAINER AND MEASURING THE PRESSURE INSIDE THE CONTAINER.



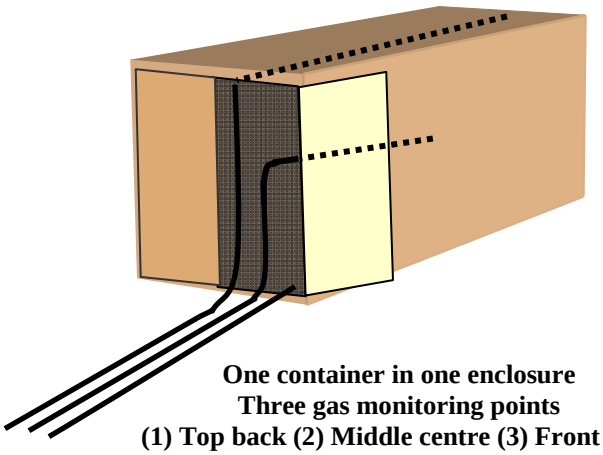
The 'finger manifold' is designed to deliver compressed air into a container, pressurise it and allow the pressure decay to be measured. The manifold (illustrated above) has twelve 'fingers', nine of which deliver compressed air into the container, while three measure the pressure within it. The 'fingers' are made of soft copper tubing that can be bent to shape as necessary.

The manifold can be bent to fit either over the front of the sill or between the vertical door seal. In either case sealant is applied between the fingers of the manifold and door seals and removed after the pressure test has been completed**.**

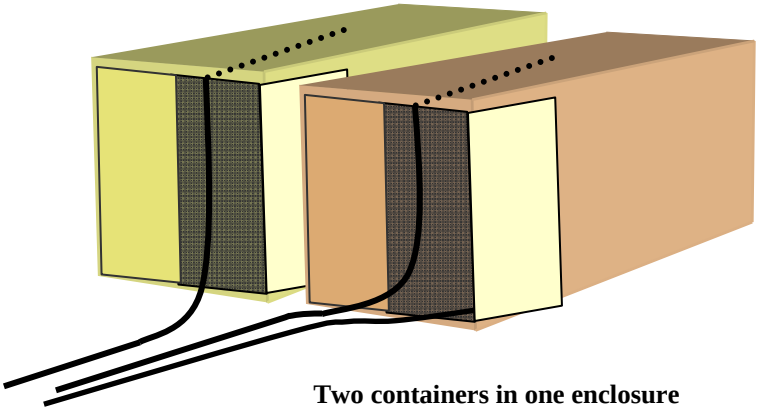
FIGURE 2. TECHNICAL DRAWING OF THE FINGER MANIFOLD FOR PRESSURE TESTING FREIGHT CONTAINERS.



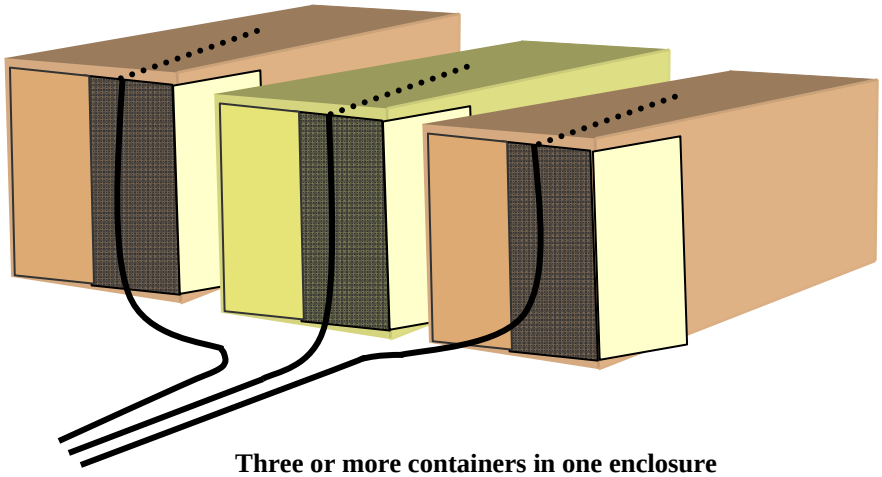
APPENDIX 7: Monitor tube placement for container fumigation



One container in one enclosure
Three gas monitoring points
(1) Top back (2) Middle centre (3) Front base



Two containers in one enclosure
Three gas monitoring points
One top centre of the commodity in each container, one front base of either container

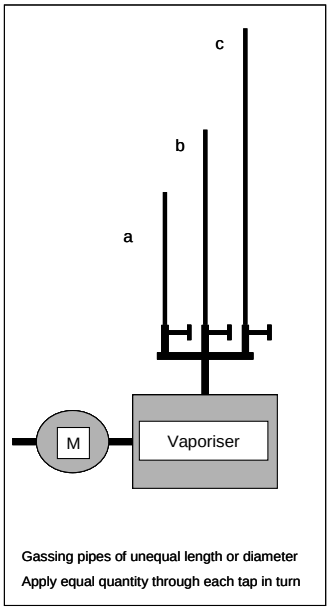


Three or more containers in one enclosure
One gas monitoring point at the top centre of the commodity in each container

APPENDIX 8: Fumigant gas supply pipe systems

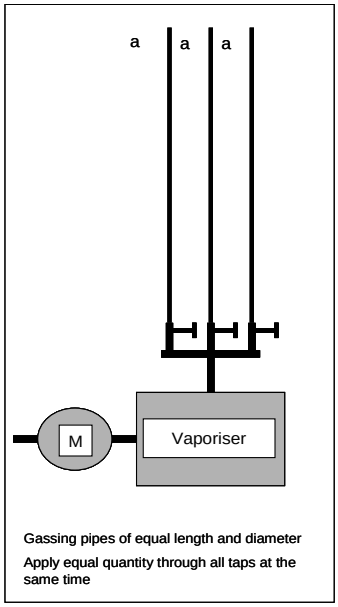
When gas is introduced into an enclosure through multiple supply pipes of differing length or diameter, the amount of gas flowing through each pipe will vary due to friction between the gas and sides of the pipe, as well as the flow dynamics of the gas.

Arrangements of gas supply pipes for single and multiple manifold systems to ensure balanced distribution of fumigant gas into the fumigation enclosure.



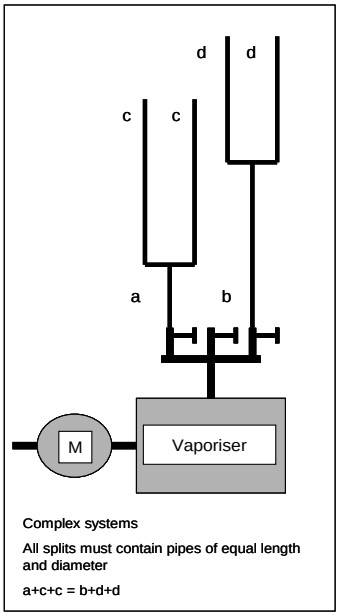
Gassing pipes of unequal length or diameter

Apply equal quantity through each tap in turn



Gassing pipes of equal length and diameter

Apply equal quantity through all taps at the same time



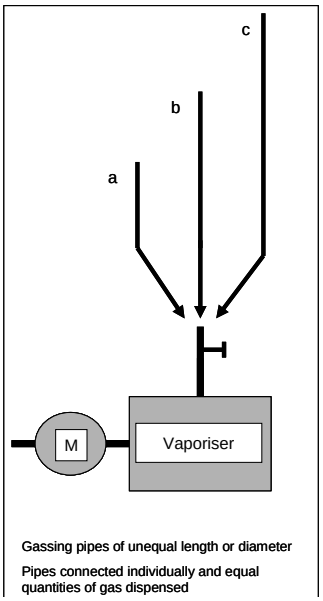
Complex systems

All splits must contain pipes of equal length and diameter

a+c+c = b+d+d

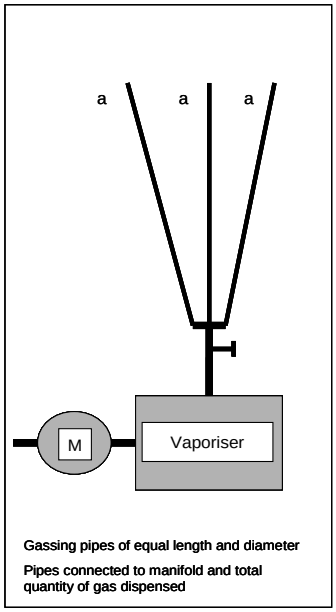
Multiple Manifold Systems

M – Volumetric measuring device (dispenser) or scales.



Gassing pipes of unequal length or diameter

Pipes connected individually and equal quantities of gas dispensed



Gassing pipes of equal length and diameter

Pipes connected to manifold and total quantity of gas dispensed

Complex Systems

These examples demonstrate possible methods of creating balanced systems for distribution of fumigant gas.

Multiple manifold systems are the most adaptable, allow for quick, safe and effective fumigation and are recommended.

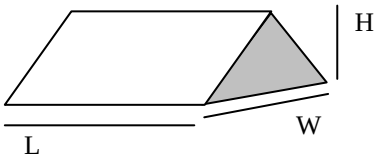
Single Manifold Systems

The overlying principle is that a balanced system will distribute the same volume of gas through each arm of the system at the same time. If it is not possible to achieve a balanced system then balanced application must be achieved by distributing measured amounts of gas through each arm of the system in turn.

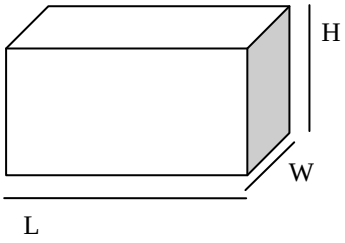
APPENDIX 9: Calculating the volume of differently shaped fumigation enclosures

The following guidelines may be used to assist in calculating the volume of differently shaped fumigation enclosures:

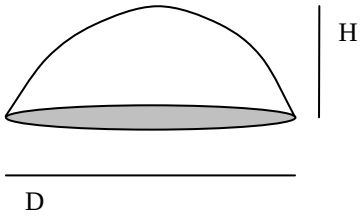
Shape 1



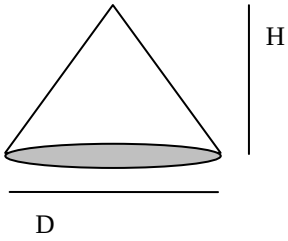
Shape 2



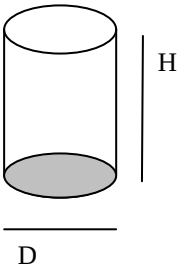
Shape 3



Shape 4



Shape 5



The internal volume of a fumigation enclosure can be calculated by adding up the volume of its parts where:

L = Length W = Width H = Height
R = Radius (Diameter/2) D = Diameter (Radiusx2)
π (Pi) = 3.142

Volumes are:

Shape 1 (triangular prism):	1/2(L x W x H)
Shape 2 (rectangular prism):	L x W x H
Shape 3 (dome):	2/3(π x R x R x R)
Shape 4 (cone):	1/3(π x R x R x H)
Shape 5 (cylinder):	π(R x R) x H

APPENDIX 10: Vaporisers for methyl bromide

The following is a design for a simple yet sophisticated vaporiser that can be made cheaply with locally available components.

The following materials and methods are required:

The Heat Transfer Coil

The coil should be made from copper tubing and should be at least 12 metres long. It can be made from one continuous length of copper tubing (12 mm in diameter [ID]). However, a much faster gas flow can be achieved by constructing it from three five metre lengths of tubing of increasing diameter; 6 mm ID, 9 mm ID and 12 mm ID, for example. The system illustrated below (Diagram 1) will allow the gas to escape quickly through the outlet, avoiding excessive back-pressure, which can slow down gas flow from the cylinder.

The whole system should allow for at least 0.1 square metres of tubing surface for every kilogram of fumigant to be vaporised each minute.

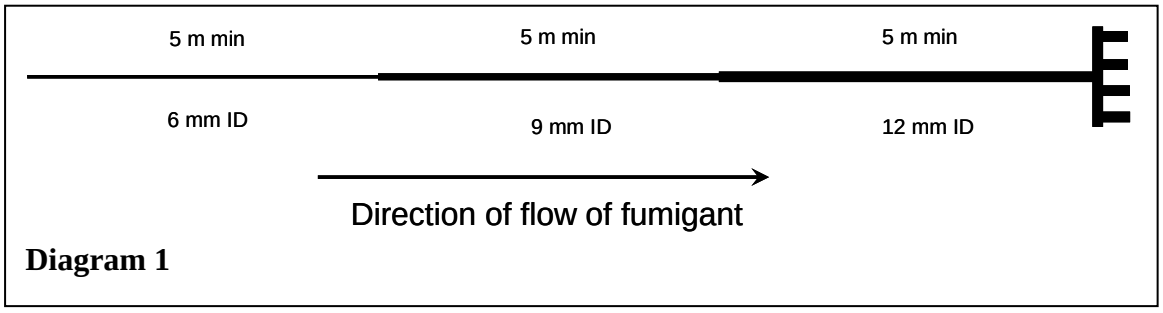


Diagram 1

The lengths of tubing must be carefully joined in a manner that is completely gas-tight. Suitable connectors should be fitted to the inlet and outlet to meet the requirements of the gas inlet and outlet pipes. This instruction shows the use of a manifold with four outlet taps that easily allow for a balanced system to fumigate up to four or more containers at the same time, ensuring that the same amount of gas is introduced to each.

The manifold should be constructed from 19 mm to 24 mm tubing, with suitable gas taps and outlets fitted.

The tubing should be coiled as tightly as possible to allow for the coil to fit into a suitable water container. The inlet and outlet ends should be positioned above the top segment of the coil so that they are clear of the water bath (see Diagram 2).

The Water Container

Stainless steel sheet 1.6 mm thick should be used to construct the water container and cowling because mild steel sheet rusts very rapidly. Handles should be provided to allow for lifting.

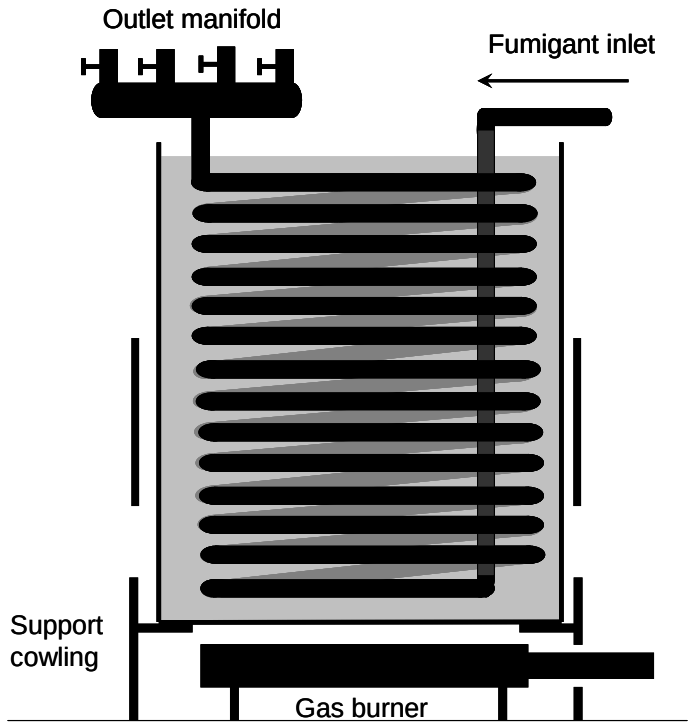


Diagram 2

A cowling should be included to support the container above the gas burner and to protect the burner from the wind.

The Gas Burner

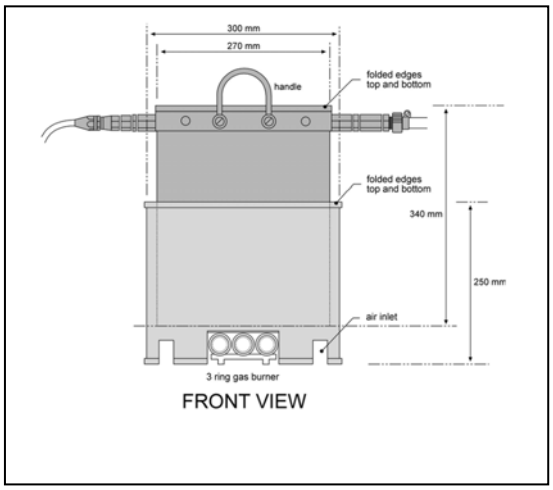
A three-ring gas burner of the type used for boiling large food pots is satisfactory.

Care should be taken to use a burner that can be adjusted to burn with a hot flame, to ensure that adequate heat can be applied to the water container both before and during the application of the fumigant.

Fittings

The choice of fittings for both inlet and outlet will depend on the individual and the equipment used.

However it is strongly recommended that good quality, gas rated fittings are used. Threaded fittings on all gas piping is strongly recommended, rather than relying on hose clamps to hold piping in place on bare copper tubing.



APPENDIX 11: Methyl bromide fumigation ready reckoner

AQIS Monitoring Ready Reckoner for Methyl Bromide

Australian Government
Australian Quarantine and Inspection Service

Dosing Phase	Initial Dosage	24 g/m³	32 g/m³	40 g/m³	48 g/m³	56 g/m³	64 g/m³	72 g/m³	80 g/m³	128 g/m³	Dosing is complete once ALL the required amount of gas has been applied to the enclosure.
Gas Distribution Phase Start Point	½ - 1 hr after gas introduction (75% or more of initial dose)	24.0 / 18	32.0 / 24	40.0 / 30	48.0 / 36	56.0 / 42	64.0 / 48	72.0 / 54	80.0 / 60	128 / 96	Start Point is achieved when ALL monitor readings are at or above the Standard AND within 15% of the lowest reading (Equilibrium). The duration of the fumigation is measured from when the Start Point is achieved.
	> 1 hr after gas introduction (70% or more of initial dose)	24.0 / 16.8	32.0 / 22.4	40.0 / 28	48.0 / 33.6	56.0 / 39.2	64.0 / 44.8	72.0 / 50.4	80.0 / 56	128 / 89.6	
Fumigation Phase Methyl Bromide Concentration After Start Point	2 hrs after start point (60% or more of initial dose)	19.4 / 14.4 / 9.4	24.2 / 19.2 / 14.2	29.0 / 24 / 19.0	33.8 / 28.8 / 23.8	38.6 / 33.6 / 28.6	46.4 / 38.4 / 30.4	51.2 / 43.2 / 35.2	56.0 / 48 / 40.0	84.8 / 76.8 / 68.8	The exposure period commences when the Start Point has been reached. For example, if a 24 hr fumigation reaches Start Point 1 ½ hrs after dosing the fumigation is considered complete 25 ½ hrs after dosing and ALL concentrations are at or above the standard specified for 24 hrs.
	4 hrs after start point (50% or more of initial dose)	17.0 / 12 / 7.0	21.0 / 16 / 11.0	25.0 / 20 / 15.0	29.0 / 24 / 19.0	33.0 / 28 / 23.0	40.0 / 32 / 24.0	44.0 / 36 / 28.0	48.0 / 40 / 32.0	72.0 / 64 / 56.0	
	12 hrs after start point (35% or more of initial dose)	13.4 / 8.4 / 3.4	16.2 / 11.2 / 6.2	19.0 / 14 / 9.0	21.8 / 16.8 / 11.8	24.6 / 19.6 / 14.6	30.4 / 22.4 / 14.4	33.2 / 25.2 / 17.2	36.0 / 28 / 20.0	52.8 / 44.8 / 36.8	
	24 hrs after start point (30% or more of initial dose)	12.2 / 7.2 / 3.0*	14.6 / 9.6 / 4.6	17.0 / 12 / 7.0	19.4 / 14.4 / 9.4	21.8 / 16.8 / 11.8	27.2 / 19.2 / 11.2	29.6 / 21.6 / 13.6	32.0 / 24 / 16.0	46.4 / 38.4 / 30.4	
	48 hrs after start point (25% or more of initial dose)	11.0 / 6 / 3.0*	13.0 / 8 / 3.0*	15.0 / 10 / 5.0	17.0 / 12 / 7.0	19.0 / 14 / 9.0	24.0 / 16 / 8.0	26.0 / 18 / 10.0	28.0 / 20 / 12.0	40.0 / 32 / 24.0	

A = Standard concentration

B = Minimum concentration to allow top up

C = Maximum top up concentration

* Methyl bromide concentrations less than 3 g/m³ are below the threshold for effectiveness.

Methyl bromide concentrations (g/m³) required to meet the AQIS standard

Version 2.6 November 2008

APPENDIX 12: Examples of 'Top-up' calculations

Chart 1: Graphic to illustrate use of top-up procedure described in this Standard

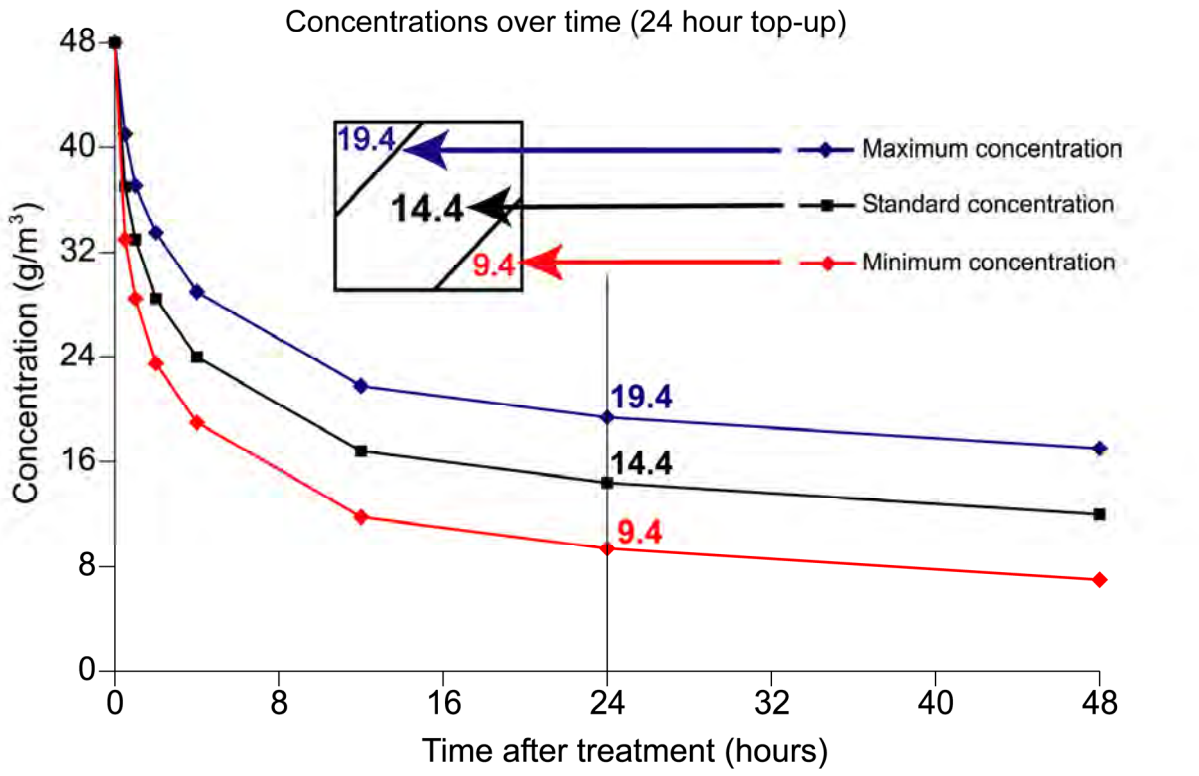


Chart 1 graphically shows what should happen to methyl bromide levels during a well-sealed, sheeted fumigation, based on the values in Table 3. and an initial dosage of 48g/m^3. Also shown are the boundaries around the standard concentration, below which the fumigation will not be acceptable. The middle line (standard concentration represents the theoretical progress of a fumigation treatment in a well-sealed sheeted fumigation enclosure.

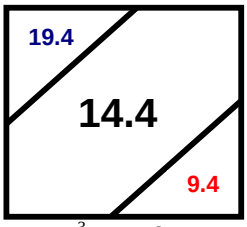
The middle line is the **AQIS STANDARD CONCENTRATION** (value A in the *Methyl Bromide Fumigation Ready Reckoner*).

The lower boundary is the **Minimum concentration to allow top-up** (value B in the *Methyl Bromide Fumigation Ready Reckoner*).

The upper boundary is the **Maximum top-up concentration** (value C in the *Methyl Bromide Fumigation Ready Reckoner*).

If the methyl bromide concentration falls below the minimum concentration then **the fumigation has failed** and a **TOP-UP MAY NOT BE CARRIED OUT.**

Example 1 – Top-up at the end of the fumigation period



48 g/m^3 @ 24 hours

Fumigation has been carried out, applying methyl bromide at 48 g/m^3. At 24 hours the lowest fumigant concentration at the monitor points is 12 g/m^3.

12 g/m^3 is below the AQIS Standard for 48 g/m^3 at 24 hours (14.4 g/m^3, as shown, centre figure) but above the Minimum Concentration to allow top-up (9.4 g/m^3 as shown, bottom right figure).

The AQIS Standard allows for the fumigant concentration to be topped-up to the Maximum Top-Up Concentration (19.4 g/m^3 as shown, top left figure).

To determine the amount of fumigant to be added to the enclosure, subtract the lowest concentration from the maximum top up value, as shown below:

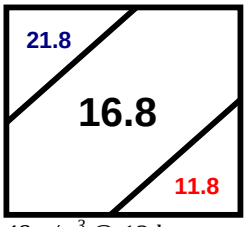
19.4 - 12 = 7.4 g/m^3 x volume of the enclosure

This figure is multiplied by the volume of the enclosure to determine the total dosage to be applied. The fumigant should be evenly distributed to the entire enclosure, using a vaporiser, with fans operating.

The fumigation period must be extended by 4 hours, at which time ALL monitor points must read at or above the standard (for the 24 hour standard figure).

Where any concentration has dropped below the standard, only one top-up procedure is permitted.

Example 2 – Continuous top-up during the fumigation period



48 g/m^3 @ 12 hours

Fumigation has been carried out, applying methyl bromide at 48 g/m^3. At 12 hours the lowest fumigant concentration on the monitor tubes is 17 g/m^3.

It is suspected that fumigant levels may drop below standard by the end of the fumigation and a decision to top-up is made.

The AQIS Standard allows for the fumigant concentration to be topped-up to the Maximum Top-Up Concentration (21.8 g/m^3 as shown, top left figure).

To determine the amount of fumigant to be added to the enclosure, subtract the lowest concentration from the maximum top up value, as shown below:

21.8 - 17 = 4.8 g/m^3 x volume of the enclosure

This figure is multiplied by the volume of the enclosure to determine the total dosage to be applied. The fumigant should be evenly distributed to the entire enclosure, using a vaporiser, with fans operating.

No extension of the fumigation period is required, as long as the concentration has not fallen below the standard. Multiple top-up actions may take place where the concentration has not fallen below the standard.

APPENDIX 13: Methyl bromide as a quarantine fumigant

Methyl bromide fumigation has been used globally as a disinfestation treatment for many years. It has a reputation for effectiveness against a wide range of pests and commodity combinations. It is favoured in many countries for plant quarantine because of its reputation for having:

- Good penetrating ability;
- Rapid action;
- High toxicity to a broad spectrum of insects and similar pests.

It is frequently used for treating timber, agricultural products, empty containers, foodstuffs, seeds and plants.

Due to its recognised effectiveness and the lack of well-tested alternatives, AQIS currently uses methyl bromide extensively for preventing exotic pest incursions into Australia. Methyl bromide is equally important as a treatment allowing Australian exporters to meet the importing requirements of other countries.

AQIS aims to minimise methyl bromide use where possible, due to its damaging effect on the ozone layer and the likelihood that it may be phased out completely. (see Appendix 14: Methyl Bromide as an Ozone Depleting Gas). This includes encouraging the efficient use of methyl bromide at minimum effective application rates and avoiding re-treatments by providing comprehensive and accurate information on treatment requirements.

Safety and methyl bromide formulations

Methyl bromide is an extremely toxic, odourless gas. Regulations in some countries may specify that methyl bromide used in fumigation treatments must contain a warning agent. This is typically 2% chloropicrin. However, methyl bromide with chloropicrin is phyto-toxic to live plants, cut flowers, fresh fruit and vegetables and seeds. In Australia chloropicrin residues are not permitted in many foodstuffs.

NOTE
In some situations the chloropicrin may condense and pool, increasing the health and safety hazards associated with the use of methyl bromide.

APPENDIX 14: Methyl bromide as an ozone depleting gas

At a meeting of signatories to the Montreal Protocol in November 1992, methyl bromide was listed as a category 1 ozone depletant. This decision was made due to concern that methyl bromide's continued use would threaten the integrity of the ozone layer. This is a major environmental concern as the depletion of the ozone layer allows greater amounts of ultra violet (UV) radiation to reach the surface of the Earth. Subsequently, developed countries have agreed to progressively phase out the general use of methyl bromide by the year 2005 (except for quarantine and specific exemption purposes) and developing countries by 2015.

In recognition of the importance of methyl bromide as a quarantine tool, without alternatives in many cases, an international exemption on phase out for quarantine purposes has been agreed to for the time being. However, it is likely that as the agricultural use of methyl bromide is phased-out the costs of producing methyl bromide will increase substantially, and the gas may become increasingly difficult to obtain. As a result, and despite the current exemption, it is likely that methyl bromide has only a limited future for quarantine purposes.

AQIS recognises the ozone depleting properties of methyl bromide and seeks to actively promote reduced methyl bromide use, within the constraints of quarantine protection, through:

- Encouraging effective use of treatments with this fumigant at minimum effective application rates;
- Advising its client industries of acceptable alternatives to methyl bromide where available;
- Encouraging quality assurance practices that minimise reliance on end-point treatments as the primary measure to reduce quarantine risks associated with pest infestation in goods.

Australia supports the use of technologies that recycle or trap methyl bromide, preventing it from escaping into the atmosphere providing all other requirements of the AQIS Methyl Bromide Standard are met.

Suppliers and users of methyl bromide need to be aware that importing this gas into Australia without a licence, is prohibited under the Commonwealth's *Ozone Protection Act 1989*.

APPENDIX 15: Glossary of terms

Term	Definition
Ambient temperature	Temperature of the air immediately surrounding the fumigation enclosure.
Chloropicrin	A strong-smelling chemical commonly added to the odourless methyl bromide to indicate the presence of gas.
Commodity	The item or goods that are being exported or targeted for fumigation.
Concentration	The amount of fumigant present at a certain point in the fumigation enclosure, usually expressed as grams per cubic metre (g/m^3)
Consignment	Refers collectively to the commodity, any packing materials used and the mode of transport such as a freight container.
Container (freight container)	Standardised transportation units intended to be suitable for transporting a variety of commodities.
Dosage	The calculated amount of fumigant applied to a fumigation enclosure, usually expressed as kilos or grams.
Dry dock	Narrow basin, trench or area that may be flooded and is large enough to hold a vessel. After flooding, the basin is able to be sealed from the body of water and emptied of water to allow work to be carried out on the vessel.
Dunnage	Materials used for supporting or protecting commodities during transportation.
External timber	Any timber components used in construction or fittings of the yacht e.g. railings, non-slip strips on deck.
Free air space	Empty space between, above or around a commodity to allow the fumigant access to the commodity to eradicate pests.
Fumigant	A chemical, which at a particular temperature and pressure can exist in a gaseous state in sufficient concentration and for sufficient time to be lethal to insects and other pests.
Fumigant supply pipe	A relatively large diameter pipe used to supply fumigant to a fumigation enclosure.
Fumigation	Application of a fumigant to a fumigation enclosure to eradicate pests.
Fumigation certificate	Documentation certifying that a fumigation treatment has been undertaken in compliance with AQIS requirements.
Fumigation chamber	A permanent chamber used for fumigation purposes that meets the AQIS pressure test requirements.
Fumigation enclosure	Any space or area designed to contain fumigant for the purposes of fumigation. Examples include gas-tight containers, gas-proof sheets sealed to an impermeable floor with sand or water snakes, and purpose built structures.
Fumigation sheets	Gas impervious material (generally made from vinyl, coated nylon or polyethylene) capable of creating a temporary fumigation enclosure (also known as tarps or tarpaulins).
Gas equilibrium	At the start of fumigation, where the gas concentration at each monitoring point is within 15% of the lowest reading. AQIS only accepts that a fumigation exposure has started AFTER it has been demonstrated that equilibrium has been achieved and concentrations at all monitoring points are at or above the standard.
Internal timber	Any timber items found inside the yacht e.g. wooden fittings, floors, drawers and panels.
Monitoring tube	A relatively small diameter tube used to withdraw a sample of gas/air mixture from within a fumigation enclosure for measuring fumigant concentration.
Normal atmospheric pressure (NAP)	Standard, natural atmospheric (air) pressure (10^5 Pa).
Pallet	A platform used to support commodities during shipment generally of standard dimensions to allow for easy stacking. Pallets used in shipping are generally made of timber, plywood, metal, plastic or moulded fibreboard.

Term	Definition
Patent slip	Moveable cradle that is able to slide under the vessel's keel in the water, then transport the vessel beyond the high tide mark to a work area.
Perishable commodities	Cut flowers, fresh fruit, vegetables and nursery stock.
Permeability	The rate at which a substance (such as methyl bromide) flows through a material (such as a fumigation sheet).
Pest	Any animal, plant or other organism that may pose a threat to the community or the natural environment.
Phytotoxic	Poisonous to plants.
Quarantine pest	A pest of potential economic and/or environmental importance to an area where it is not yet present, or is present but not widely distributed and is being officially controlled.
Risk area	Any area in proximity to a fumigation enclosure into which fumigant may escape in hazardous concentrations as determined by local legislation relevant to fumigation practice in the location in which the treatment is performed. May also be referred to as 'danger area'.
Sand snake	Sand filled tubes approximately 1 metre long used as weights to hold fumigation sheets in place during fumigation.
Sealed vessel	Yacht or vessel that may be effectively sealed to retain gas pressure as per the AQIS pressure testing requirements (see Section 4.2, 4.3 and Appendix 5).
Sheet fumigation	A process of creating a gas-tight enclosure by covering/enclosing the commodities to be fumigated under a gas proof sheet, which is sealed to an impermeable floor (generally using sand or water snakes).
Sheeted vessel	Yacht or vessel that has been covered by a fumigation sheet that meets AQIS requirements (see Section 4 and 5, Sheet fumigation).
Sorption/sorptive	The uptake of a fumigant by any material being treated with a fumigant. This may be reversible (unchanged fumigant may be released on ventilating) or irreversible (leading to residues of fumigant or breakdown of products in the commodity).
Threshold Limit Value (TLV)	TLV is the maximum concentration of fumigant that a worker can be repeatedly exposed to in the workplace without harmful effects. This figure is based on an 8 hour day, 40 hour working week and is currently 5ppm in Australia.
Timber (also known as lumber)	A term of commerce for wood, either as logs or sawn units.
Under gas	Term used to describe container(s) that do not have documentation that states that the container has been ventilated to TLV (5ppm in Australia).
Uniform gas distribution	See gas equilibrium.
Water snakes	Water filled tubes used as weights to seal fumigation sheets to the floor. These perform the same function as sand snakes. Water snakes are much longer and wider than sand snakes.
Yachts	Non-commercial vessels of any dimension for private use, either powered or under sail.

Methyl Bromide – Record of Fumigation

Job Details

Job Identification	Customer Name	Start Date of Fumigation	Location

Description of Consignment

Target of Fumigation	Container Numbers / Consignment Identification

Fumigation Details

The consignment complies with the following requirements of the *Standard*:

Adequate free airspace, no impervious surfaces or wrapping, maximum timber thickness & spacing ☐ Yes ☐ No

☐ Sheeted Containers ☐ Sheeted Stack Size: Qty:	Enclosure Dimensions L H W
☐ Pressure Tested Container ☐ Chamber Decay Time = seconds	Volume = m^3

Specified Dosage Rate	Exposure Period	Forecast Minimum Temp	Dosage Rate Used
g/m^3	hrs	°C	g/m^3
Calculated Dosage	**Chloropicrin** ☐ N/A	**Actual Dosage Applied**	**Time Dosing Finished**
g	% g	g	

Concentration Readings

Phase	Time of Reading	Standard g/m^3	Monitor Line Readings by Location 1:	2:	3:	4:	5:	Equilibrium Calculation	Top-up Dose
Start								%	
								%	
During									
End									

Comments

Ventilation

Initial TLV	Date & Time Taken	2nd TLV Reading	Date & Time Taken
ppm		ppm	

Fumigator in Charge		Quarantine Officer (if supervised)	
Name	Signature	Name	Signature

Appendix B

Appendix B Training Resources for the AFAS Train-the-Trainer Course

Australian Government
Australian Quarantine and Inspection Service

TRAIN THE TRAINER

AFAS Fumigation Training

DEPARTMENT OF AGRICULTURE, FISHERIES AND FORESTRY

Course Objective

- At the completion of this training participants will be able to:
  - Effectively deliver the AFAS fumigation training package
  - Conduct accreditation assessments
  - Evaluate the effectiveness of their training

Course structure

- Contents
  - Learning principles
  - Effective communication
  - The trainer
  - Presenting the training
  - Accreditation assessment
  - Planning
  - Evaluating the training

Learning Principles

Adult learning

- Make the training relevant
- Acknowledge and build upon prior learning and experience
- Let the trainees take responsibility
- Use problem solving in realistic situations to develop understanding
- Demonstrate respect

Active Learning

- Ask questions
- Reinforce key points
- Repetition
- Apply the new knowledge and skills
- Link related information
- Feedback
- Reward

Effective Communication

Communication

- What is communication?
  - It is an exchange of information
    - It requires a sender
    - It requires a means of transmission
    - It requires a receiver

The Communication Process

- Message
- Transmission
- Interpretation
- Evaluation
- Response

Speaking

- Speak clearly
- Talk loud enough so that everyone can hear
- Use appropriate language
- Don’t talk too fast
- Take time to pause
- Vocalisation

Questioning

- Encourages participation
- Checks understanding
- Provides feedback to the trainer
- Identifies the needs of the trainees

Types of Questions

- Open
- Closed
- Specific
- Hypothetical
- Reflective
- Leading questions

Listening

- Focus on the person
- Do not interrupt
- Encourage
- Empathise
- Reflect what the person said
- Ask clarification questions
- Non-verbal cues

Face to Face Communication

- Verbal
  - The words
- Non – verbal
  - Vocal
  - Physical

Vocalisation

- Tone of voice
- Loudness
- Pitch
- Inflection

Physical Cues

- Facial expressions
- Gestures
- Body language
- Proximity
- Eye contact
- Appearance

The Trainer

Appearance

- Dress appropriately
- Relax
- Be yourself

Credibility

- Know the subject matter
- Be familiar with the course content and how to present it
- Display confidence
- Be honest
- Be professional

Presentation Style

- Engage the audience
- Encourage comments and questions
- Involve all participants
- Be flexible
- Suit the personality of the trainer

Rapport

- Use the trainee's names
- Make eye contact
- Acknowledge comments and questions
- Focus on the positive
- Be accessible
- Be culturally aware
- Accommodate different personalities of the participants

Presenting the Training

Interacting With the Group

- Ice breakers
- Eye contact
- Gestures and body language
- Movement
- Anecdotes
- Silence

Handling Questions

- Listen to the question
- Consider your response
- Use the class
- Don’t pretend to know the answer
- Has the question been answered
- Manage the amount of time spent on questions

Using the PowerPoint Presentation

- Know the content
- Revealing the slides
  - Don't just read the slide
- Using trainers notes
- Setting up
  - Check the equipment

Using the Whiteboard

- Make sure it is clean
- Write clearly
- Use coloured markers that can be easily seen
- Create your own examples
- Listing responses
- Invite participants to use where appropriate

Timing

- Start on time
- Breaks
- Check and manage progress
- Flexibility

Sharing the Trainers Role

- Plan the roles
- Support
- Contribute
- Assist

Accreditation Assessment

Conducting the Assessment

- Put the trainee at ease
- Test their knowledge
  - They can refer to the Standard
- Check their understanding
- Record of Assessment
  - Trainee's details
  - Guideline questions
  - Calculations

The Assessment Decision

- Do they know the important information
  - Can they find it in the Standard if needed
- Do they understand the reasons for key requirements of the Standard
  - Can they apply their knowledge in different situations
- Did they complete the calculations correctly and without assistance
- Preparation
  - Were they prepared for the assessment

The Assessment Result

- **Competent**
  - Demonstrates sufficient knowledge and understanding of the Standard
  - The assessor is confident they can apply their knowledge to ensure the fumigation will be effective and comply with the Standard
- **Not Yet Competent**
  - Does not yet demonstrates sufficient knowledge and understanding of the Standard
  - The assessor NOT is confident they can apply their knowledge to ensure the fumigation will be effective and comply with the Standard

The Role of the Assessor

- During the assessment
  - Be supportive
- Making the decision
  - Fair
  - Consistent
- Informing the trainee
  - Not yet competent
    - Explain the reason
    - What do they need to do to become competent

Planning

Pre-course Planning

- Participants
  - Industry
  - Government
- Dates
  - Training
  - Assessments
- Trainers
  - Availability
  - Experience

Pre-course Planning

- Venue
  - Classroom
    - Size
    - Facilities
  - Practical
    - Access
    - Safety
- Timetable
  - Travellers
  - Practical
  - Assessments

Pre-course Planning

- Equipment
  - Presentation
  - Practical
- Accreditation certificates
  - Preparation
  - Distribution
- Costs
  - Who is paying
  - How much

Training Materials

- Current training package CD
- Trainers notes
- Workbooks
- Copies of the Standard
- Calculation exercises and scenarios
- Record of Assessment

Evaluating the Training

Evaluating the Course

- Training
  - Content
  - Delivery
  - Timing
  - Materials
  - Participation
- Venue
  - Location
  - Facilities
- Assessments

Evaluation Information

- Sources of information
  - Course evaluation sheet
  - Trainee feedback
  - Trainer observations
  - Assessment results
  - Audit results

Appendix C

Appendix C Scoping Visit Reports for Samoa, Solomon Islands and Vanuatu

REGIONAL 06 – Implementation of the Australian Fumigation Accreditation Scheme (AFAS) for PHAMA countries (Report - Solomon Islands 8 – 11 October 2012)

1. Summary

This report summarizes observations and findings from a scoping visit to the Solomon Islands to assess practices, facilities and equipment currently used to conduct methyl bromide fumigation treatments.

The report finds that although upwards of seventy (70) methyl bromide fumigation treatments to meet phytosanitary requirements (particularly containerized sawn timber) are being performed monthly by providers at the port of Honiara, there are no apparent regulatory controls or fumigation standards imposed by the Solomon Islands Agriculture Quarantine Service (SIAQS). This ultimately leads to doubt as to whether the treatments are being performed effectively and safely.

The report also finds a monopoly exists with one business being the sole treatment provider in the Solomon Islands that can currently perform a methyl bromide fumigation treatment for timber to Australia. This situation will continue unless other potential treatment providers or exporters are willing to purchase the equipment required to perform methyl bromide fumigations.

With PHAMA funding individuals from the Solomon Islands Agriculture Quarantine Service (SIAQS) and private sector to attend AFAS methyl bromide training in Fiji in November 2012, the scoping visit also provided the opportunity for the reviewer to pre-screen potential applicants for the upcoming training.

2. Observations and Findings

2.1 Solomon Islands Agriculture Quarantine Service

An Entry Meeting was held with senior SIAQS personnel on 8 October 2012 to provide an overview of the scoping visit and to discuss the planned agenda for the visit. SIAQS provided the following information relating to methyl bromide fumigation treatments in the Solomon Islands.

Demand

The Solomon Islands Agriculture Quarantine Service (SIAQS) do not perform methyl bromide fumigation treatments and do not supervise, monitor or audit methyl bromide treatment providers. Methyl bromide treatments performed by providers are however endorsed on phytosanitary certificates by SIAQS.

Training

Staff from the SIAQS have not undergone fumigation training in any capacity since the mid to late 1990's when the New Zealand Ministry for Primary Industries provided training as part of the commissioning of the now abandoned Renadi Treatment Centre. Records and the scope of the fumigation training were not provided to the reviewer at the time of the scoping visit.

Equipment

The reviewer was advised by SIAQS that they did not have any equipment to conduct or monitor methyl bromide fumigations. Additionally, the SIAQS

advised that they were not in possession of personal protective equipment (PPE) to conduct or monitor methyl bromide fumigations.

AFAS Trainees

The SIAQS nominated four staff to attend the AFAS fumigation training in Fiji in November. The staff nominated were:

- Max Kolubalona
- John Pupulu
- Samuel Hone
- Sosimo Rarahoa

2.2 Providers & Exporters

Due to previous commitments, key personnel from Island Enterprises Limited, Value Added Timber Association (VATA) and Farmers Fumigation were unable to attend a stakeholder workshop organized for 10 October to discuss the objectives of the scoping visit, therefore the reviewer held individual meetings with the above mentioned businesses outside the stakeholder workshop.

Island Enterprises Limited

Demand

Island Enterprises Limited fumigate 30 to 50 shipping containers (20 foot) of sawn timber each month prior to export to Australia. The containers are loaded at the exporters premises, moved to the wharf precinct and fumigated by introducing the gas into a hole drilled in the top of the shipping container. Pressure testing or sheeting of the containers does not occur prior to fumigation and gas concentration readings are not undertaken during any period of the fumigation. Additionally, fans are not used to circulate the fumigant.

Training

The reviewer was advised three staff from Island Enterprises Limited had undergone a four-day methyl bromide training course conducted in Solomon Islands by an accredited AFAS provider (Kevin Gerard) approximately 2-3 years previous. Records or certificates of the training were not provided at the time of the meeting with Island Enterprises Limited.

Equipment

Island Enterprises Limited advised the reviewer the company was in possession of the following equipment to undertake methyl bromide fumigations:

- 3 x methyl bromide decanters (volumetric cylinders);
- 3 x vaporizers;
- 1 x MiniRAE PID;
- 2 x halide lamps; and
- Gas masks for each fumigator.

The reviewer did not sight this equipment during the time of the scoping visit.

AFAS Trainees

Island Enterprises Limited advised the reviewer they were willing to nominate 3 people to attend the training in Fiji should positions be available.

Farmers Fumigation

Demand

Approximately 30 shipping containers (20 foot) of sawn timber are fumigated by Farmers Fumigation each month for various export destinations. The containers are loaded at the exporter's premises, moved to the wharf precinct and fumigated by introducing the gas via tubing through the container door and closing. Pressure testing or sheeting of the containers does not occur prior to fumigation and gas concentration readings are not undertaken during any period of the fumigation. Additionally, fans are not used to circulate the fumigant.

Training

The owner of Farmers Fumigation, Jack Koti, was trained in methyl bromide fumigation practices in the mid 1990's when employed by SIAQS as a Quarantine Officer.

Equipment

Farmers Fumigation advised the reviewer the company was in possession of the following equipment to undertake methyl bromide fumigations:

- 1 x methyl bromide decanters (volumetric cylinder); and
- 1 x halide lamp.

The reviewer did not sight this equipment during the time of the scoping visit.

AFAS Trainees

Jack Koti of Farmers Fumigation advised the reviewer he was willing to attend the fumigation training in Fiji should a position be available.

Value Added Timber Association (VATA)

VATA is a non government organization with approximately 800 members that exports containerized rough sawn timber to New Zealand and Australia. The reviewer was advised by VATA that approximately three containers of timber a month were being fumigated for export to New Zealand. VATA also advised they were not exporting sawn timber to Australia due to costs associated with the methyl bromide fumigation treatment.

VATA use the fumigation services provided by Farmers Fumigation and do not have equipment or PPE to conduct a fumigation. VATA did express interest in having one participant attend the AFAS training in Suva.

2.3 Stakeholder Workshop

A stakeholder meeting was held in Honiara on 10 October and was attended by 12 people from the public and private sector. A PowerPoint presentation was presented to the group to outline the purpose of the scoping visit and provide context to AFAS.

From this meeting a number of participants from the private sector expressed interest in attending the AFAS training in Fiji or alternatively being part of fumigation training if this was conducted in the Solomon Islands.

2.4 Facilities

Ranadi Treatment Facility

The abandoned quarantine treatment facility at Ranadi was visited during the scoping visit. The facility has been abandoned for many years following damage to the building following civil unrest.

During the visit to the treatment facility at Ranadi the SIAQS advised the reviewer that there were intentions to re-commission the facility when funds became available. The facilty had been previously used to conduct small volume methyl bromide fumigation treatments (chamber size approximately 8 -10m^3) and incineration of quarantine waste from vessels and aircraft.

Solomon Islands Port Authority

It was established during the scoping visit that most container fumigations were being performed at the Solomon Islands Port Authority controlled Honiara port.

The Solomon Islands Port Authority has hardstand areas (concrete pads) however the reviewer was advised space in the wharf precinct is at a premium and most fumigations were performed on unsealed surfaces (dirt).

3. Analysis

Solomon Islands Agriculture Quarantine Service

1. The SIAQS are not providing methyl bromide fumigation treatment services or currently monitoring or supervising methyl bromide treatments performed by industry. Methyl bromide treatments are however being endorsed on phytosanitary certificates by the SIAQS.
2. The SIAQS do not have a standard, work procedure, work instruction or other document to provide guidance to industry on how to conduct methyl bromide fumigations.
3. There appears to be few skills within the SIAQS to either undertake or audit a methyl bromide fumigation treatment performed by industry. This is not unexpected as methyl bromide fumigation training has not been undertaken by SIAQS for a number of years.
4. SIAQS do not have the equipment or PPE to undertake or audit a methyl bromide treatment performed by industry.
5. It is apparent the SIAQS see their role as an audit and verification function for fumigation treatments being performed by the private sector. There were discussions however relating to the re-commissioning of the Ranadi treatment facility (including the fumigation chamber), though it was unclear as to how the facility would operate.

1. There are currently two providers (Island Enterprises Limited & Farmers Fumigation) performing methyl bromide fumigation treatments in the Solomon Islands.
2. Export fumigations are performed at the Solomon Islands Port Authority controlled Honiara port in shipping containers. Few fumigations are being performed on concrete hardstand due to limited space.
3. Import fumigations occur either at the port or at the importers premises.
4. It is estimated that 30 - 70 shipping containers of sawn timber are being fumigated each month prior to export.
5. Neither treatment provider is fumigating to the AQIS Methyl Bromide Standard or appear to be following a procedure specific to methyl bromide fumigations.
6. Neither treatment provider has gas monitoring devices to read the concentration of methyl bromide in a container or chamber.
7. DAFF have suspended Farmers Fumigation from fumigating exports of sawn timber to Australia.

4. Conclusion

1. For the SIAQS to be able to perform an audit and verification function of treatment providers or exporters (following AFAS traing), the purchase of methyl bromide monitoring devices and PPE is required.
2. To effectively perform an audit and verification function, the SIAQS will need to develop fumigation operating procedures that providers and exporters will need to follow and be audited against.
3. It is apparent the start up costs associated with buying equipment to perform a fumigation (monitoring and leak detection devices, volatiliser, fans, sheeting etc) is an impediment to some potential treatment providers or exporters in becoming fumigators.
4. High fumigation treatment costs (for timber to Australia) were identified as a reason for not exporting by one exporter.
5. There is willingness by Island Enterprises to purchase the equipment necessary to perform fumigations to meet the AQIS Methyl Bromide Standard. There appears to be an unwillingness by Farmers Fumigation to purchase the equipment necessary to perform a fumigation to meet the AQIS Methyl Bromide Standard due to cost.
6. A monopoly currently exists with Island Enterprises Limited being the sole treatment provider in the Solomon Islands that can perform a fumigation treatment for timber to Australia. This situation will continue unless other potential treatment providers or exporters are willing to purchase the equipment required to perform a fumigation.
7. There is an immediate need for the SIAQS to determine a standard or level required for methyl bromide fumigation treatments conducted in the Solomon Islands. A level or standard equivalent to the AQIS Methyl Bromide Standard may be overly ambitious and or detrimental to industry. Appendix 1 provides examples of levels or standards that may be considered by SIAQS.

5. Potential Participants for AFAS Training

The following list of participants has been compiled for the consideration of the Director of Quarantine Solomon Islands:

- SIAQS (3 x participants – Max Kolubalona, John Pupulu and either Sosimo Rarahoa or Samuel Hone)
- Island Enterprises (1 x participant – likely Paul Tawo)
- Farmer Fumigation (1 x participant - Jack Koti)
- Value Added Timber Association (1 x participant – Eric Tolilalo)
- Solfish (1 x participant – TBA)
- Solomon Island Port Authority (1 x participant – TBA)

APPENDIX 1 – Example Fumigation Standards

Fumigation Standard 1

Meeting all the requirements of the AQIS MBr Standard:

Benefit in adopting this Standard:

- Potential for Solomon Islands to gain AFAS accreditation.
- SIAQS potentially having a high level of assurance that fumigations are being carried out to the requirement.

Disadvantage in adopting this Standard:

- Resource intensive activity for SIAQS.
- High costs to SIAQS associated with the purchase and maintenance of equipment to monitor fumigations.
- Likely to result in fewer providers thus potentially increasing costs of fumigation services to exporters.
- May not be achievable in the first instance.

Fumigation Standard 2

Meeting all the requirements of the AQIS MBr Standard with the following exceptions:

SIAQS to purchase PPE, monitoring and gas leakage devices and monitor in accordance with the AQIS MBr Standard for all fumigation treatments. Provider to undertake fumigation services however does not purchase monitoring and gas leakage devices.

Benefit in adopting this Standard:

- Less cost to provider in having to purchase equipment/more providers can potentially offer fumigation services.
- SIAQS having high level of assurance the fumigation has been carried out to requirement.

Disadvantage in adopting this Standard:

- Resource intensive activity for SIAQS
- High costs to SIAQS associated with the purchase and maintenance of equipment to monitor fumigations.
- Does not build capacity within the private sector.

Fumigation Standard 3

Meeting all the requirements of the AQIS MBr Standard with the following exceptions:

All containers to be fumigated are sheeted in accordance with the AQIS MBr Standard/no pressure testing of containers. Gas concentration device required by provider, however gas leak detection equipment to a minimum halide lamp

standard only. SIAQS to perform audit and verification activities on a percentage of fumigation treatments

Benefit in adopting this Standard:

- Less cost to provider in not having to purchase pressure testing equipment and gas leak detection equipment/ more providers can potentially offer fumigation services.
- SIAQS having high level of assurance the fumigation has been carried out to requirement.
- Less resource intensive activity for SIAQS.
- Builds capacity within the public and private sector.

Disadvantage in adopting this Standard:

- *If adequate care not taken, potential for MBr exposure at levels that cannot be detected by halide lamp.*

REGIONAL 06 – Scoping visit – Samoa – [September 2012] - Implementation of the Australian Fumigation Accreditation Scheme (AFAS) for PHAMA countries

Report complied from scoping visit conducted by Gordon Weinert (AFAS)

1. Summary

This report summarizes observations and findings from a scoping visit to Samoa to assess practices, facilities and equipment currently used to conduct methyl bromide fumigation treatments.

2. Observations and Findings

Demand

The Samoa Quarantine Service performs all methyl bromide fumigations in Samoa.

Methyl bromide fumigations are usually performed at either the port or importer's premises in shipping containers without sheeting. No information was obtained on the number of containers fumigated per week/month.

The Samoa Quarantine Service also maintains a small fumigation facility located at the quarantine office at the shipping port. There are regular fumigations, mainly for cane mats exported by air to New Zealand.

Practices

Methyl bromide fumigations are performed in shipping containers that are not pressure tested or sheeted. There is no leak detection performed after the introduction of the fumigant nor are fans used to circulate the fumigant. There is no monitoring of gas concentration levels during or at the completion of the fumigation

Following fumigation, there is no checking that the container has been ventilated to safe levels.

There would appear to be no consistent use of personal protective equipment by the Samoa Quarantine Service staff when performing fumigations.

Equipment

A vaporizer is available and appears to be used for the methyl bromide fumigations. Other equipment that would be needed to perform fumigations to the AFAS standard including gas concentration measuring equipment, monitoring tubes, fans, signage and sand snakes are not available.

The fumigation sheet located at the quarantine office and used to fumigate cane mats for export is in poor condition with many holes clearly visible. It would be unlikely to be able to retain sufficient gas.

The reviewer was advised there are two Self Contained Breathing Apparatus units available, however these are currently not being used due to inadequate training of the operators.

Full-face gas masks are available however there appears to be no suitable filters in stock.

The Samoa Quarantine Service is in possession of 2 Riken leak detectors however they are in need of servicing and calibration.

AFAS Trainees

As the Samoa Quarantine Service currently perform all methyl bromide fumigations, it would be desirable to have staff that perform the fumigations attend AFAS training.

3. Analysis & Conclusion

1. The SQS perform all methyl bromide fumigation treatments however it is not clear whether the SQS follow a procedure specific to methyl bromide fumigations.
2. SQS do not have the necessary equipment or PPE to undertake methyl bromide treatments to the AFAS standard.
3. It is unclear whether previous methyl bromide fumigation training has been undertaken by SQS.

REGIONAL 06 – Scoping visit – Vanuatu [September 2012] - Implementation of the Australian Fumigation Accreditation Scheme (AFAS) for PHAMA countries

Report complied from scoping visit conducted by Gordon Weinert (AFAS)

1. Summary

This report summarizes observations and findings from a scoping visit to Port Vila, Vanuatu to assess practices, facilities and equipment currently used to conduct methyl bromide fumigation treatments.

2. Observations and Findings

Demand

The Vanuatu Quarantine Service (VQS) performs all methyl bromide fumigations.

There are approximately 30 container fumigations per month in Port Vila mainly for imported products. The island of Santo also performs a similar number of fumigations in containers.

The port at Santo is more export orientated as the island has a larger agricultural industry supplying to overseas markets and the reviewer was advised has better hardstand facilities for sheet fumigations.

Practices

Methyl bromide fumigations are performed in shipping containers that are not pressure or sheeted. There is no leak detection performed after the introduction of the fumigant nor are fans used to circulate the fumigant. There is no monitoring of gas concentration levels during or at the completion of the fumigation

Following fumigation, there is no checking that the container has been ventilated to safe levels.

There would appear to be no consistent use of personal protective equipment by the Vanuatu Quarantine Service staff when performing fumigations.

Equipment

There is a small fumigation facility located near the airport for fumigating artifacts for tourists. The fumigations are performed on a concrete slab covered with a tarpaulin. There are two old, unused fumigation chambers at this site that appear to be beyond repair.

A vaporizer is not used for the methyl bromide fumigations. Other equipment that would be needed to perform fumigations to the AFAS standard including gas concentration measuring equipment, monitoring tubes, fans and signage are not available.

There are a number of boxes of unopened AX filter canisters (perhaps 100 or more) at the airport site. There are two facemasks but they are in poor condition and would need to be cleaned and repaired. It appears that the fumigators are not using personal protective equipment consistently.

AFAS Trainees

As the Vanuatu Quarantine Service currently perform all methyl bromide fumigations, it would be desirable to have staff that perform the fumigations attend AFAS training.

3. Analysis & Conclusion

1. The VQS perform all methyl bromide fumigation treatments however it is not clear whether the VQS follow a procedure specific to methyl bromide fumigations.
2. VQS do not have the necessary equipment or PPE to undertake methyl bromide treatments to the AFAS standard.
3. It is unclear whether previous methyl bromide fumigation training has been undertaken by VQS.

Appendix D

Appendix D Training Resources for the AFAS Audit Training Course

AQIS Methyl Bromide Fumigation Training

Version 3.9

Trainee Workbook

Name:_____

Australian Government
Australian Quarantine and Inspection Service

THE AUSTRALIAN FUMIGATION ACCREDITATION SCHEME (AFAS)

Fumigation With Methyl Bromide For Quarantine Purposes

DEPARTMENT OF AGRICULTURE, FISHERIES AND FORESTRY

Introduction

Australian Government
Australian Quarantine and Inspection Service

The Australian Fumigation Accreditation Scheme

AFAS

AFAS Framework

Australian Government
Australian Quarantine and Inspection Service

AFAS implementation and management:

- Training
  - Fumigation training
  - Audit training
  - Train the Trainer
- Fumigator accreditation
- Treatment provider registration
- Auditing and inspection
- Joint system reviews

Trainers

Australian Government
Australian Quarantine and Inspection Service

Your Trainers

Course Objective

Australian Government
Australian Quarantine and Inspection Service

Industry Fumigators

- To provide the knowledge and skills necessary to perform an effective fumigation in accordance with the *AQIS Methyl Bromide Fumigation Standard*

Government Officers:

- To provide the knowledge and skills to assess if a treatment provider complies with the *AQIS Methyl Bromide Fumigation Standard*

Outcomes of the Course

Australian Government
Australian Quarantine and Inspection Service

At the end of this course you will understand the:

- Principles of fumigation
- Properties of methyl bromide relevant to fumigation
- Occupational health & safety (OH&S) risks associated with methyl bromide
- Equipment needed to perform an effective fumigation
- Documentary requirements

Outcomes of the Course (cont.)

Australian Government
Australian Quarantine and Inspection Service

At the end of the course you will be able to:

- Conduct site and risk assessments
- Determine the suitability of a consignment for fumigation
- Set up a gas tight enclosure
- Calculate and apply the correct dose
- Monitor the fumigation
- Safely ventilate the enclosure

Competency Assessment

Australian Government
Australian Quarantine and Inspection Service

Each candidate will be assessed for competency by:

- One-on-one interviews
- Calculation exercises

Candidates assessed as competent will be presented with an accreditation certificate

Course Outline

Australian Government
Australian Quarantine and Inspection Service

Part 1	Principles of fumigation
Part 2	Performing a fumigation
Part 3	Field Training
Part 4	Scenarios
Part 5	Assessments

Australian Government
Australian Quarantine and Inspection Service

PRINCIPLES OF FUMIGATION

DEPARTMENT OF AGRICULTURE, FISHERIES AND FORESTRY

Quarantine Fumigations

Australian Government
Australian Quarantine and Inspection Service

What is the reason for doing quarantine fumigations?

To reduce the risk of introducing pests and diseases into the importing country.

What is a Fumigant?

Australian Government
Australian Quarantine and Inspection Service

A fumigant is:

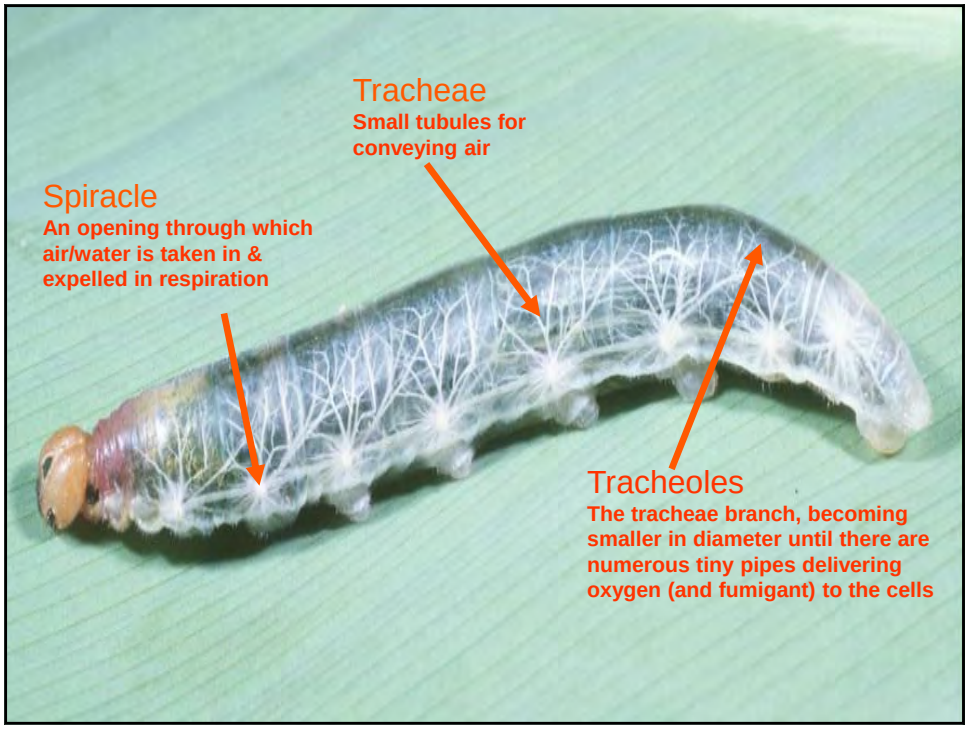
- A **GAS** that is lethal to organisms (insects, animals, plants, fungi) if they are **EXPOSED** to a sufficient **CONCENTRATION** for a sufficient length of **TIME.**

How Fumigants Work

Australian Government
Australian Quarantine and Inspection Service

Fumigants work by:

- Insects taking up fumigant when they respire
- Insects take up more fumigant when they are active
- Insect activity is affected by
  - Temperature
  - Humidity
- Increasing the concentration of fumigant for low temperatures ensures more fumigant is taken in with each breath



Properties of Methyl Bromide

Australian Government
Australian Quarantine and Inspection Service

Important properties of methyl bromide:

- Colourless and odourless gas - sometimes chloropicrin is used as a warning agent
- Boiling point = 3.6˚ C
- 1 kg = 577ml
- 1 kg of liquid expands to 257 litres of gas
- 3.27 times heavier than air
- Non-flammable at fumigation concentrations

Methyl Bromide as a Fumigant

Australian Government
Australian Quarantine and Inspection Service

Fumigation properties of methyl bromide:

- Good penetration
  - Up to 100mm into timber
  - Will not penetrate plastics, paints, lacquered surfaces
- Fast acting
- Effective against a broad range of pests
- Can be only be used if the temperature is above 10˚ C

Methyl Bromide as a Fumigant (cont.)

Australian Government
Australian Quarantine and Inspection Service

- Supplied as a liquid under pressure in cylinders or cans
- Solvent of organic materials
- Reacts with aluminium, magnesium, zinc and strong alkalis when liquid
- Methyl bromide is an ozone depleting gas

Fumigant Concentration

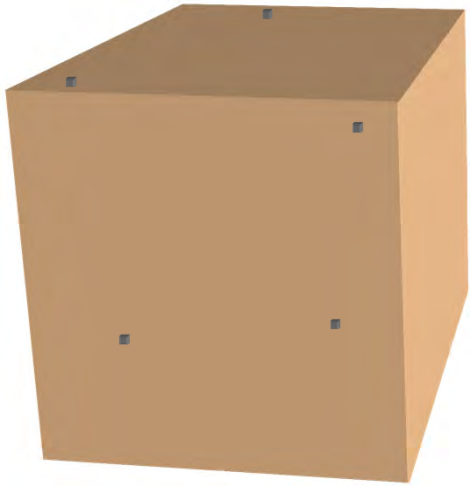
Australian Government
Australian Quarantine and Inspection Service

Concentration - The amount of fumigant present in a known volume

- High concentrations are usually expressed as weight per unit of volume
  - Grams per cubic metre (g/m^3)
- Lower concentrations as
  - Parts per million (ppm)

Parts Per Million (ppm)

Australian Government
Australian Quarantine and Inspection Service



What is a part per million?

1 cent in $10,000
1 second in 11 ½ days
1 mm in 1 km

TLV = 5 ppm

Conversion Table (approximate)

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Australian Quarantine and Inspection Service

g/m³	Oz/1000ft³	ppm
0.02	0.02	5
0.06	0.06	15
1.00	1.00	257
3.96	3.96	1,000
32.00	32.04	8,081
48.00	48.06	12,122

Dose Rate

Australian Government
Australian Quarantine and Inspection Service

Dose rate – the concentration of fumigant that needs to be applied to the enclosure for a defined period of time.

For example:

- Timber is usually fumigated at
  - 48 g/m^3 for 24 hours
- Khapra beetle
  - 80 g/m^3 for 48 hours

The dose rates for most commodities exported to Australia can be found at www.aqis.gov.au/icon

Australian Government
Australian Quarantine and Inspection Service

GAS RETENTION

DEPARTMENT OF AGRICULTURE, FISHERIES AND FORESTRY

Gas Retention

Australian Government
Australian Quarantine and Inspection Service

The AQIS Methyl Bromide Fumigation Standard is based on retaining a minimum concentration of gas over a set period of time.

An effective fumigation relies on:

- Using gas tight enclosures
- Using the correct amount of fumigant
- Even distribution of fumigant within the enclosure
- Monitoring fumigant concentrations

Factors Affecting Gas Retention

Australian Government
Australian Quarantine and Inspection Service

Fumigant concentration in the enclosure can be affected by:

- Volume of commodity in the enclosure
- Sorption
- Leakage
- Time
- Wind
- Sun

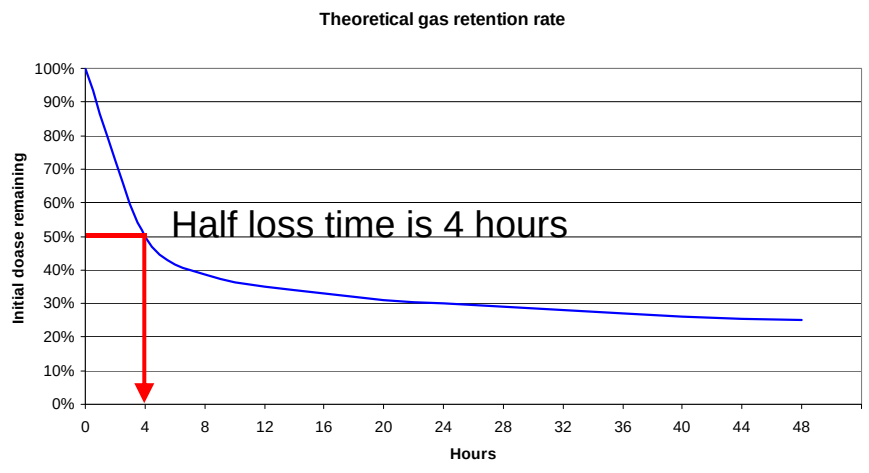
AQIS Methyl Bromide Standard - Minimum Gas Retention Requirements

Australian Government
Australian Quarantine and Inspection Service

Monitoring Times	Percentage of Original Dose
0.5 hours	75% or more
1 hour	70% or more
2 hours	60% or more
4 hours	50% or more
12 hours	35% or more
24 hours	30% or more
48 hours	25% or more

Gas Concentration Over Time (con't)

Australian Government
Australian Quarantine and Inspection Service



AQIS Monitoring Ready Reckoner for Methyl Bromide

Australian Government
Australian Quarantine and Inspection Service

Dosing Phase	Initial Dosage	24 g/m³	32 g/m³	40 g/m³	48 g/m³	56 g/m³	64 g/m³	72 g/m³	80 g/m³	128 g/m³	Dosing is complete once ALL the required amount of gas has been applied to the enclosure.
Gas Distribution Phase Start Point	½ - 1 hr after gas introduction (75% or more of initial dose)	24.0 / 18	32.0 / 24	40.0 / 30	48.0 / 36	56.0 / 42	64.0 / 48	72.0 / 54	80.0 / 60	128 / 96	Start Point is achieved when ALL monitor readings are at or above the Standard AND within 15% of the lowest reading (Equilibrium).
	> 1 hr after gas introduction (70% or more of initial dose)	24.0 / 16.8	32.0 / 22.4	40.0 / 28	48.0 / 33.6	56.0 / 39.2	64.0 / 44.8	72.0 / 50.4	80.0 / 56	128 / 89.6	The duration of the fumigation is measured from when the Start Point is achieved.
Fumigation Phase Methyl Bromide Concentration After Start Point	2 hrs after start point (60% or more of initial dose)	19.4 / 14.4 / 9.4	24.2 / 19.2 / 14.2	29.0 / 24 / 19.0	33.8 / 28.8 / 23.8	38.6 / 33.6 / 28.6	46.4 / 38.4 / 30.4	51.2 / 43.2 / 35.2	56.0 / 48 / 40.0	84.8 / 76.8 / 68.8	The exposure period commences when the Start Point has been reached. For example, if a 24 hr fumigation reaches Start Point 1 ½ hrs after dosing the fumigation is considered complete 25 ½ hrs after dosing and ALL concentrations are at or above the standard specified for 24 hrs.
	4 hrs after start point (50% or more of initial dose)	17.0 / 12 / 7.0	21.0 / 16 / 11.0	25.0 / 20 / 15.0	29.0 / 24 / 19.0	33.0 / 28 / 23.0	40.0 / 32 / 24.0	44.0 / 36 / 28.0	48.0 / 40 / 32.0	72.0 / 64 / 56.0	
	12 hrs after start point (35% or more of initial dose)	13.4 / 8.4 / 3.4	16.2 / 11.2 / 6.2	19.0 / 14 / 9.0	21.8 / 16.8 / 11.8	24.6 / 19.6 / 14.6	30.4 / 22.4 / 14.4	33.2 / 25.2 / 17.2	36.0 / 28 / 20.0	52.8 / 44.8 / 36.8	
	24 hrs after start point (30% or more of initial dose)	12.2 / 7.2 / 3.0*	14.6 / 9.6 / 4.6	17.0 / 12 / 7.0	19.4 / 14.4 / 9.4	21.8 / 16.8 / 11.8	27.2 / 19.2 / 11.2	29.6 / 21.6 / 13.6	32.0 / 24 / 16.0	46.4 / 38.4 / 30.4	
	48 hrs after start point (25% or more of initial dose)	11.0 / 6 / 3.0*	13.0 / 8 / 3.0*	15.0 / 10 / 5.0	17.0 / 12 / 7.0	19.0 / 14 / 9.0	24.0 / 16 / 8.0	26.0 / 18 / 10.0	28.0 / 20 / 12.0	40.0 / 32 / 24.0	

A = Standard concentration
B = Minimum concentration to allow top up
C = Maximum top up concentration

* Methyl bromide concentrations less than 3 g/m³ are below the threshold for effectiveness.

Methyl bromide concentrations (g/m³) required to meet the AQIS standard

Version 2.6 November 2008

Types of Enclosures

Australian Government
Australian Quarantine and Inspection Service

Fumigations commonly take place in:

- Fumigation chambers
- Pressure tested shipping containers
- Sheeted containers
- Sheeted stacks

Fumigation enclosures **MUST** be gas tight

Pressure Testing a Container

Australian Government
Australian Quarantine and Inspection Service

If a decision is made to fumigate in a container without sheeting, it must be pressure tested:

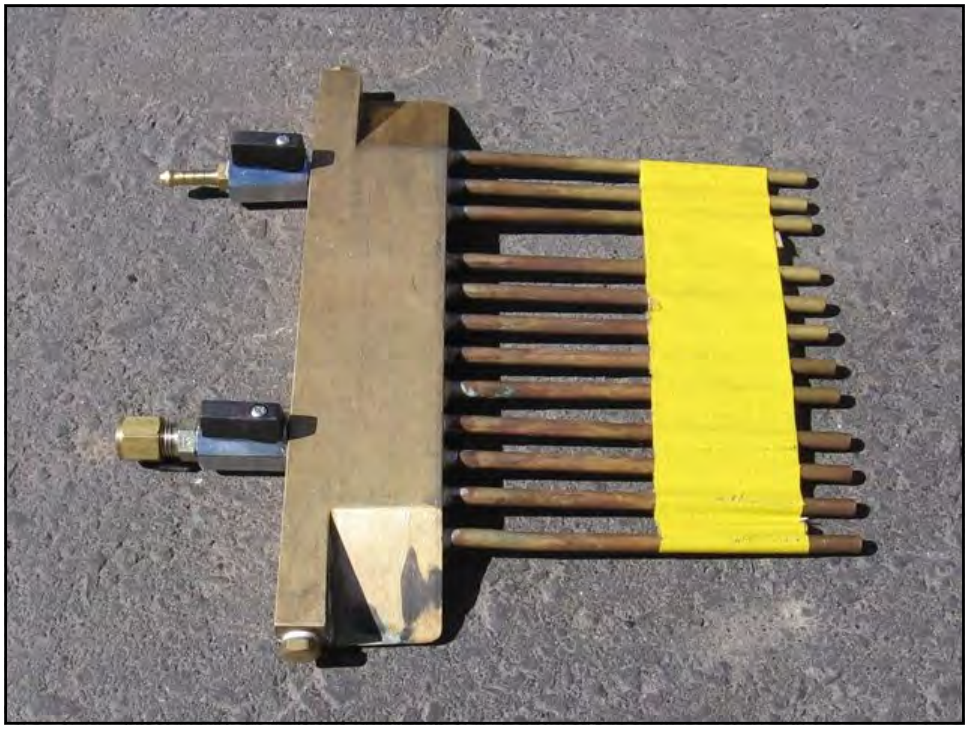
- Seal all vents from the outside to make them gas tight
- Raise the air pressure in the container to 250 Pa
- Measure the time it takes for the pressure in the container to decrease from 200 Pa to 100 Pa - this is the pressure decay time

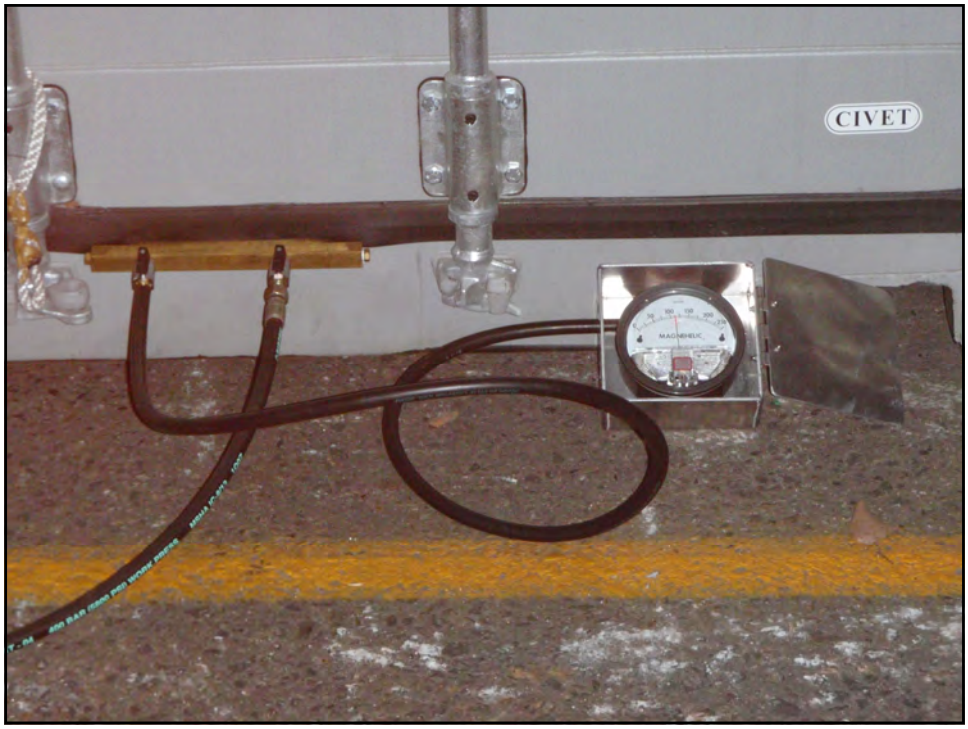
Pressure Decay Time

Australian Government
Australian Quarantine and Inspection Service

Minimum pressure decay time from 200 Pa to 100 Pa is 10 seconds:

- If the pressure decay time is 10 seconds or more the container is gas tight and can be fumigated without sheeting
- If the pressure decay time is less than 10 seconds the container is not gas tight and must be fumigated under a gas proof sheet

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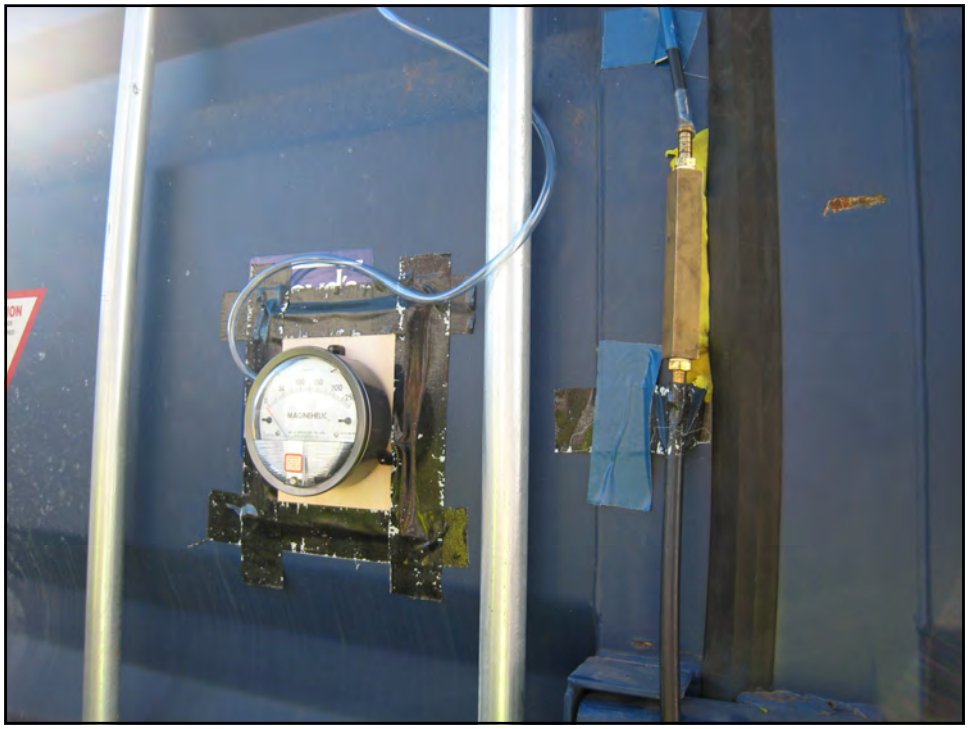


Sheeted Enclosures

Australian Government
Australian Quarantine and Inspection Service

Containers that do not pass the pressure test must be enclosed using gas proof sheets

Free-standing stacks are also fumigated under sheets

The same fumigation principles and procedures apply to both methods

Australian Government
Australian Quarantine and Inspection Service

CALCULATING FUMIGANT DOSAGE

DEPARTMENT OF AGRICULTURE, FISHERIES AND FORESTRY

Dosage

Australian Government
Australian Quarantine and Inspection Service

Dose – the amount of fumigant needed to achieve the concentration specified by the **dosage rate**

The dosage is determined by:

- Dosage rate
- Temperature
- Size of the enclosure
- Chloropicrin concentration if present

Adjusting for Temperature

Australian Government
Australian Quarantine and Inspection Service

The standard AQIS dosage rates are based on a minimum temperature of 21° C within the enclosure:

- Increase the dosage rate by 8g/m^3 for every 5° C, or part thereof, below 21° C
- No reduction of the dosage rate is allowed for temperatures above 21° C

Fumigation is not permitted where the temperature within the enclosure is expected to fall below 10° C at any time during the fumigation.

Adjusting for Temperature (cont.)

Australian Government
Australian Quarantine and Inspection Service

Original dosage rate

48g/m^3

Minimum temperature range is

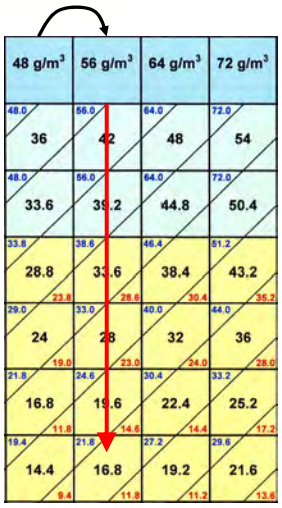
16 – 20° C

This is 1 to 5° C below 21° C so

add 8g/m^3

48 + 8 = 56g/m^3 so

use the 56g/m^3 column



Adjusting for Temperature (cont.)

Australian Government
Australian Quarantine and Inspection Service

Original dosage rate

48g/m^3

Minimum temperature range is

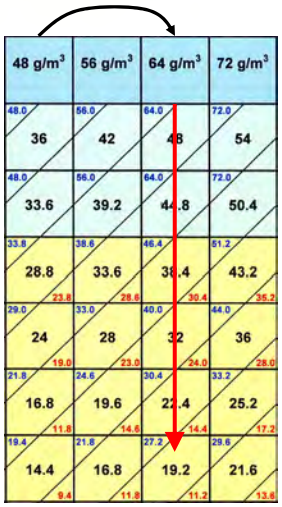
11 – 15˚ C

This is 6 to 10˚ C below 21˚ C so

add 2 x 8g/m^3 = 16g/m^3

48 + 16 = 64g/m^3 so

use the 64g/m^3 column



Adjusting for Temperature (cont.)

Australian Government
Australian Quarantine and Inspection Service

Original dosage rate

48g/m^3

Minimum temperature is

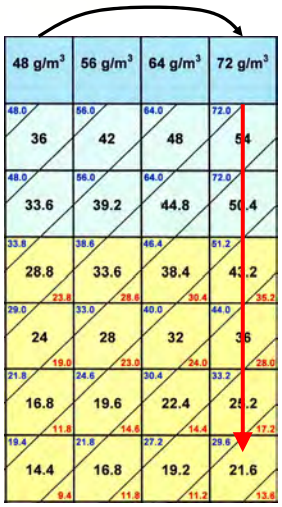
10˚ C

This is 11˚ C below 21˚ C so

add 3 x 8g/m^3 = 24g/m^3

48 + 24 = 72g/m^3 so

use the 72g/m^3 column



Temperature Below 10˚ C

Obtain the **MINIMUM** forecast temperature for the period between the start and end of the fumigation

If the temperature is expected to fall below 10˚ C you can:

- use heaters to maintain the temperature within the enclosure above 10˚ C
- move the fumigation inside a heated building

If these options are not available you cannot do the fumigation

Enclosure Volume

Calculate the volume of the enclosure:

Volume = Length x Width x Height

- Sheeted enclosure(s) - measure **external** dimensions
- Pressure tested containers or chambers – use the **internal** dimensions

Calculating Fumigant Dose

Australian Government
Australian Quarantine and Inspection Service

Calculate the dosage:

Volume x Dose rate = Dose

Adjust for chloropicrin (if present):

- Divide the dosage by 0.98 (98% methyl bromide)
- Divide the dosage by 0.985 (98.5% methyl bromide)
- Divide the dosage by 0.99 (99% methyl bromide)

Example Calculation

Australian Government
Australian Quarantine and Inspection Service

Timber fumigation example:

Volume of sheeted container

2.4m x 2.5m x 6.2m =

Multiply by the dosage rate

48g/m^3 at 21˚ C or above for timber fumigation

48g/m^3 x =

Example Calculation (cont.)

Australian Government
Australian Quarantine and Inspection Service

Adjust for temperatures below 21° C if necessary:

If forecast minimum temp is 15° C add?

$48g/m^3$ + =

The amount of methyl bromide required is?

$37.2m^3$ x =

Adjust for chloropicrin (2%) if necessary:

Rounding

Australian Government
Australian Quarantine and Inspection Service

Always round up when calculating dose:

- Round up to the nearest full increment for the method you are using to measure the dosage
- Round after all other calculations have been done

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MONITORING FUMIGATIONS

DEPARTMENT OF AGRICULTURE, FISHERIES AND FORESTRY

Monitoring

Australian Government
Australian Quarantine and Inspection Service

The gas concentration **MUST** be measured and monitored for all fumigations:

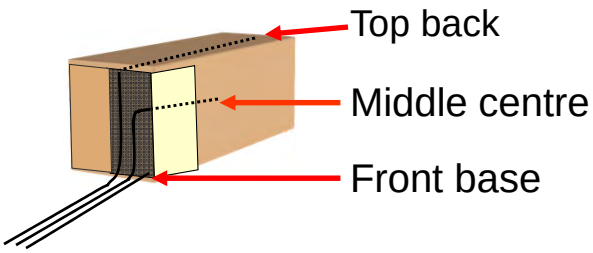
- Monitoring is carried out to show:
  - That the concentration is at or above the Standard
  - That the gas is evenly distributed throughout the fumigation enclosure
- At least 3 monitoring tubes are required for enclosures larger than $30m^3$
- Enclosures smaller than $30m^3$ still require at least one monitor tube

Monitoring Tube Placement

Australian Government
Australian Quarantine and Inspection Service

One container in one enclosure:

- A minimum of 3 gas monitoring tubes

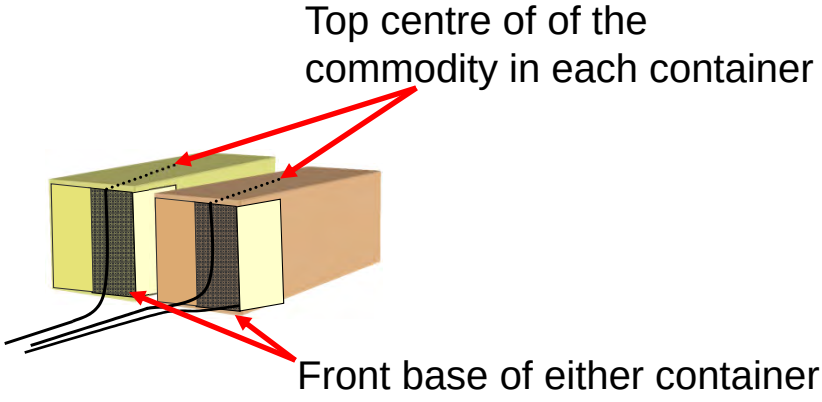


Monitoring Tube Placement (cont.)

Australian Government
Australian Quarantine and Inspection Service

Two containers in one enclosure:

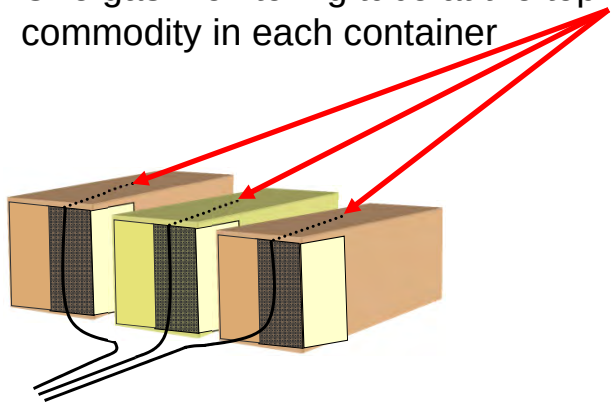
- A minimum of 3 gas monitoring tubes



Monitoring Tube Placement (cont.)

Three or more containers in one enclosure:

- One gas monitoring tube at the top centre of the commodity in each container



Smaller Enclosures

Where should the monitor tube be placed in enclosures smaller than $30m^3$?

Top centre of the commodity

Why?

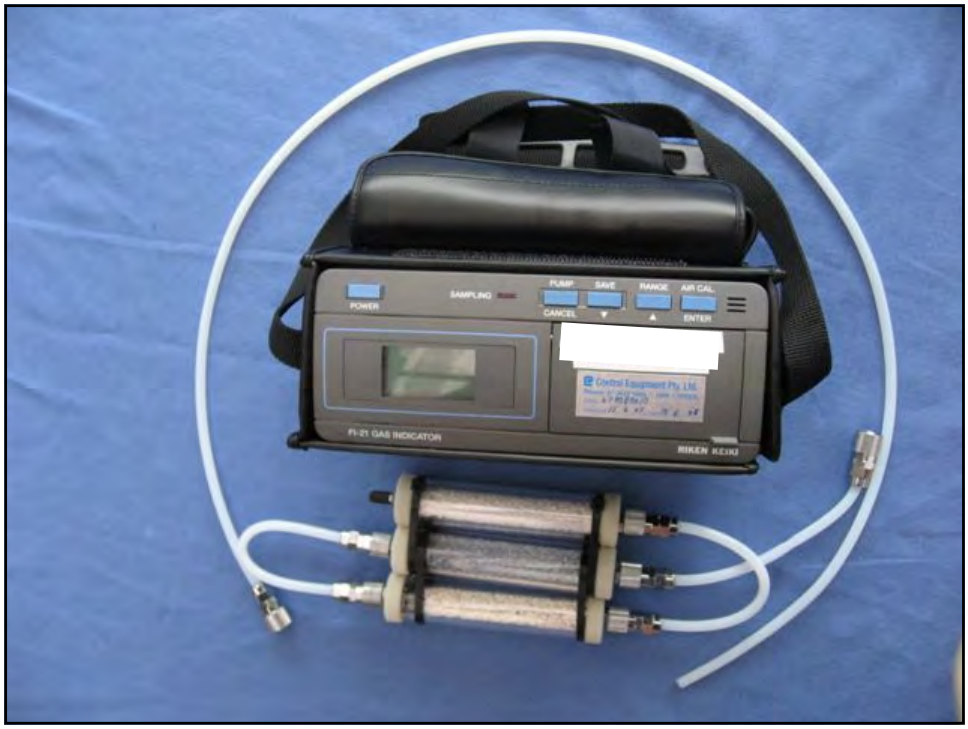
Methyl bromide is heavier than air

Measuring the Gas Concentration

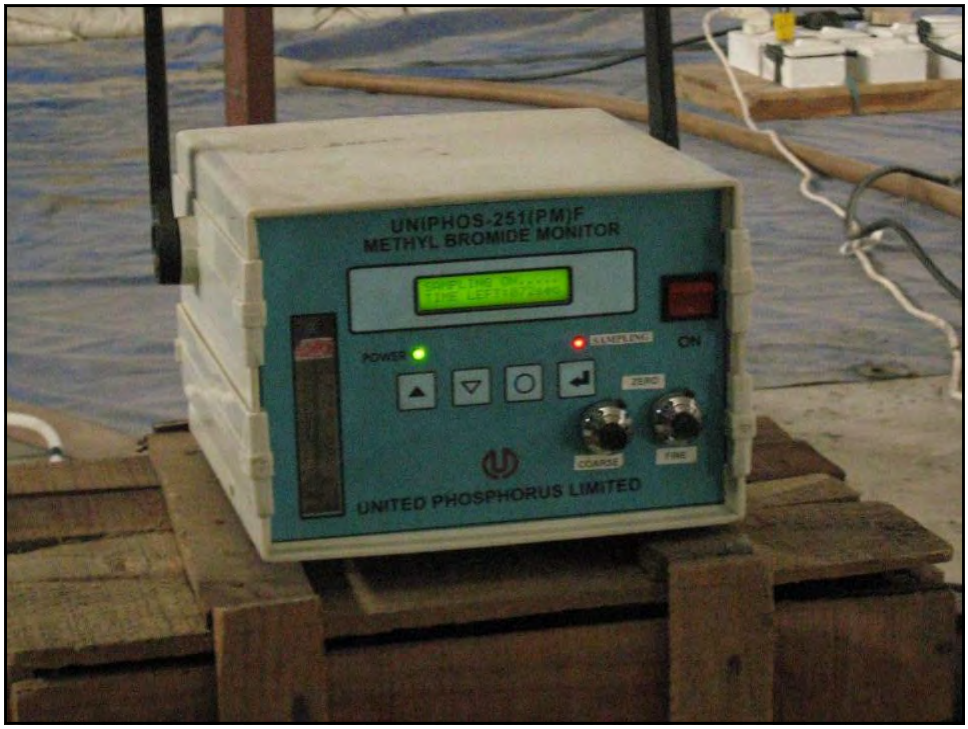
Australian Government
Australian Quarantine and Inspection Service

Instruments for measuring the gas concentrations during fumigation must be:

- Accurate and reliable
- Calibrated to manufacturer's specifications
- Used in accordance with the manufacturer's instructions
- Fitted with moisture, carbon dioxide or other filters as specified by the manufacturer
- Kept clean, dry and protected from damage




FUMISCOPE
KEY
CHEMICAL AND EQUIPMENT CO.
CLEARWATER, FLORIDA


UNIPHOS-251(PM)F
METHYL BROMIDE MONITOR
POWER
SAMPLING
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COARSE
FINE
UNITED PHOSPHORUS LIMITED

Even Distribution of Fumigant

Australian Government
Australian Quarantine and Inspection Service

The fumigant **MUST** be circulated to achieve even distribution throughout the enclosure.

Even fumigant distribution is assisted by:

- fans
- vaporising the methyl bromide
- free airspace
- using more than one supply pipe in larger enclosures

Equilibrium

Australian Government
Australian Quarantine and Inspection Service

Even distribution of gas within the enclosure is called **'equilibrium'**

Equilibrium is achieved when all concentration readings are within 15% of the lowest reading

Calculating Equilibrium

Australian Government
Australian Quarantine and Inspection Service

How to calculate equilibrium:

$$\frac{\text{(highest - lowest)}}{\text{lowest}} \text{ X } 100 = \%$$

The result must be 15% or less

Equilibrium Sample Calculation

Australian Government
Australian Quarantine and Inspection Service

For initial readings of 49, 47 & 44

Is it in equilibrium?

Equilibrium Sample Calculation

Australian Government
Australian Quarantine and Inspection Service

For readings of 64, 54, 57 & 61

Is it in equilibrium?

Start Point

Australian Government
Australian Quarantine and Inspection Service

The fumigation exposure period **does not** start until:

- The readings are ALL AT OR ABOVE the Standard concentration

  AND

- you have EQUILIBRIUM

Equilibrium is not necessary at any other time after the start of the fumigation exposure period

Timing of Monitoring

Australian Government
Australian Quarantine and Inspection Service

Frequency of readings:

- Take the first readings when you think you have reached equilibrium
  - The minimum concentration allowed at Start Point is 70% of the initial dose
- Fumigations with exposure periods up to 48 hours require start-point and end-point monitoring
- Fumigations with exposure periods of 48 hours or more require start-point, mid-point and end-point monitoring

End Point

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Australian Quarantine and Inspection Service

End-point (end time)

- The readings MUST ALL be AT OR ABOVE the Standard concentration
- Record all concentration readings and the time they were taken

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Australian Quarantine and Inspection Service

TOPPING UP

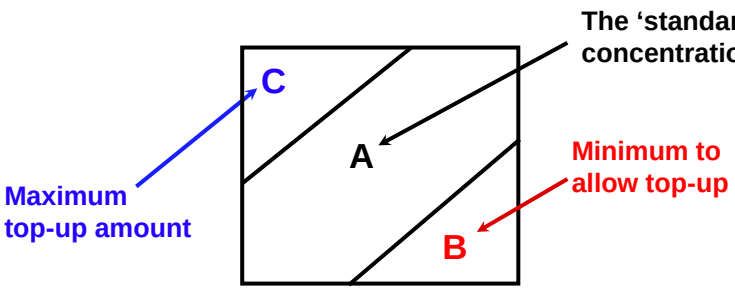
DEPARTMENT OF AGRICULTURE, FISHERIES AND FORESTRY

Topping-up

Australian Government
Australian Quarantine and Inspection Service

The AQIS standard permits, in some circumstances, gas levels to be topped up in order to prevent the fumigation from failing unnecessarily.

- AQIS ready reckoner top-up concentrations



Calculating the Top-up Amount

Australian Government
Australian Quarantine and Inspection Service

The amount of methyl bromide you can add when topping up is calculated by the formula:

Maximum (C) – Lowest reading = Dosage rate (g/m^3)

Dosage rate x volume = Top-up dosage (kg)

- Adjust for chloropicrin if necessary
- Round to the nearest increment

Top-up Calculation Example

Australian Government
Australian Quarantine and Inspection Service

If the dosage rate is $48g/m^3$ then what are the concentrations after 4 hours for:

Standard =

Minimum =

Maximum =

If the low reading is $22.6g/m^3$ the top-up dosage rate is:

If the volume is $36.5m^3$ the top-up dosage will be:

Top-up During the Fumigation

Australian Government
Australian Quarantine and Inspection Service

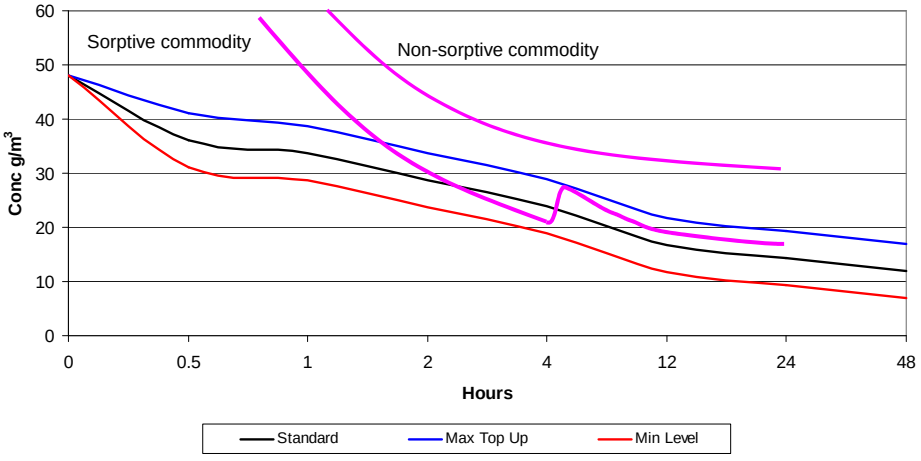
Top-up during the fumigation period:

- Should only be used for highly sorptive commodities, NOT to compensate for poor fumigation practices
- No extension of the fumigation exposure period is required
- Final readings MUST all be at or above the Standard
- Multiple top-ups are permitted providing the lowest reading has not fallen below the minimum to allow top-up

Gas Retention Example

Australian Government
Australian Quarantine and Inspection Service

Initial dosage of 48g/m^3
50% of enclosure volume displaced by the commodity



Top-up at the End

Australian Government
Australian Quarantine and Inspection Service

Top-up at the end of the fumigation period:

- Extend the fumigation by 4 hours
- Final readings taken after the 4 hours **MUST** all be at or above the Standard for the original exposure period (e.g. 24hrs)
- Only one end point top-up is permitted
- Top-up at the end is permitted even if top-ups were done during the fumigation

Topping-up

Australian Government
Australian Quarantine and Inspection Service

Performing a top-up:

- Top-up calculation formulas are the same for both top-up options
- Use the vaporiser
- Turn on the fans
- Recheck the concentrations
- Equilibrium not required
- Record the details

Topping-up (cont.)

Australian Government
Australian Quarantine and Inspection Service

Topping-up is not permitted when:

- The concentration falls below the minimum specified in the Ready Reckoner. If it does, the fumigation has **FAILED**
- The lowest concentration reading is above the maximum top-up concentration
- The fumigation is less than 12 hours
- It is done to solely compensate for poor fumigation practices

Australian Government
Australian Quarantine and Inspection Service

DOCUMENTATION

DEPARTMENT OF AGRICULTURE, FISHERIES AND FORESTRY

Record Management

Australian Government
Australian Quarantine and Inspection Service

AFAS requires at least one audit on each registered treatment provider per year

Fumigation records must be retained for a minimum of 2 years for verification and audit purposes

All records relating to a particular fumigation job should be kept together

Fumigation Documentation

Australian Government
Australian Quarantine and Inspection Service

Record of fumigation:

- Completed on site
- Refer to Appendix 4 of the Standard

Fumigation certificate:

- Certifies the fumigation complied with the AQIS Standard.
- Refer to Appendix 5 of the Standard

Gas clearance certificate (if required):

- Certifies the container is gas free - 5ppm or less

Other Audit Documentation

Export documentation:

- Export permits
- Import permits
- Treatment directions

Supplier declarations:

- Container cleanliness
- Impervious coatings or wrapping on commodity
- Bark free

Other Audit Documentation (cont.)

Commercial documentation:

- Work orders
- Bills of lading

Equipment:

- Manufacturer's instructions
- Calibration and maintenance records
- Fumigation sheet permeability

Other Audit Documentation (cont.)

Australian Government
Australian Quarantine and Inspection Service

Purchase and usage records for:

- Methyl bromide
- Detector tubes
- Gas canisters
- Other consumables

Operational records:

- Staff training
- Scheduling

Australian Government
Australian Quarantine and Inspection Service

HEALTH RISKS and PERSONAL PROTECTIVE EQUIPMENT (PPE)

DEPARTMENT OF AGRICULTURE, FISHERIES AND FORESTRY

Health Risks of Methyl Bromide

Australian Government
Australian Quarantine and Inspection Service

Methyl bromide is a poison that has a cumulative effect:

- Affects the nervous system
- Burns the skin (in liquid form)

Health Risks of Methyl Bromide (cont.)

Australian Government
Australian Quarantine and Inspection Service

Exposure to methyl bromide can cause the following symptoms:

- Headaches
- Blurred vision and slurred speech
- Tiredness
- Dizziness and staggering
- Loss of appetite
- Abdominal pains, nausea and vomiting
- Delayed reaction to exposure may occur from 8-24 hours later

Threshold Limit Value (TLV)

Australian Government
Australian Quarantine and Inspection Service

TLV is the maximum concentration a person can be repeatedly exposed to without causing harm:

- based on an 8 hour day and a 40 hour week

The TLV in Australia is 5ppm

TLV measuring equipment must be capable of measuring accurately to 1ppm:

- leak detectors generally do not meet this requirement
- specialised equipment is required for this purpose

PPE - Respirators

Australian Government
Australian Quarantine and Inspection Service

There are two main types of respirators used by fumigators:

- Self-Contained Breathing Apparatus (SCBA)
- Face mask and appropriate canister (full-face respirator)

Filter Canister

Australian Government
Australian Quarantine and Inspection Service

Use the canister recommended for the fumigant:

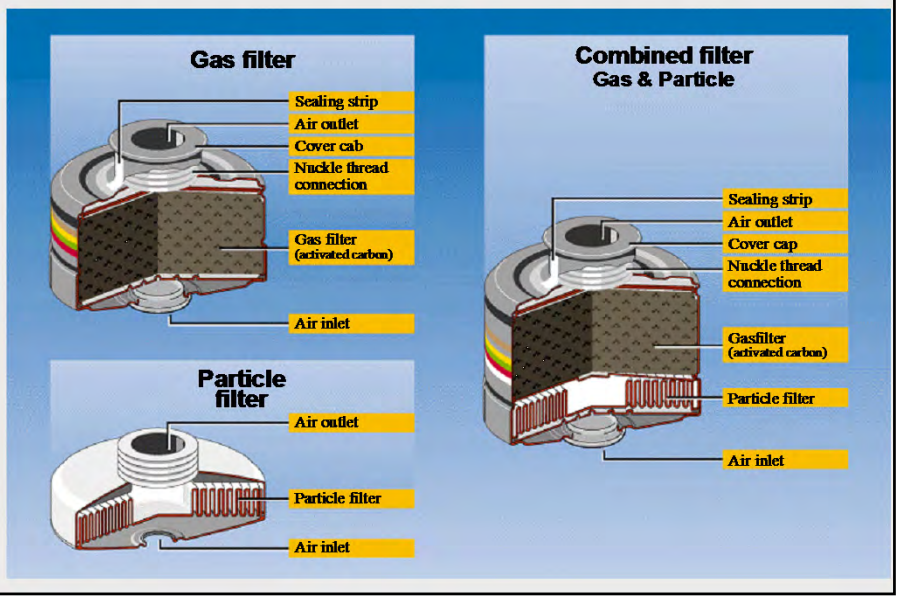
- AX for methyl bromide
- AX canisters are single day use

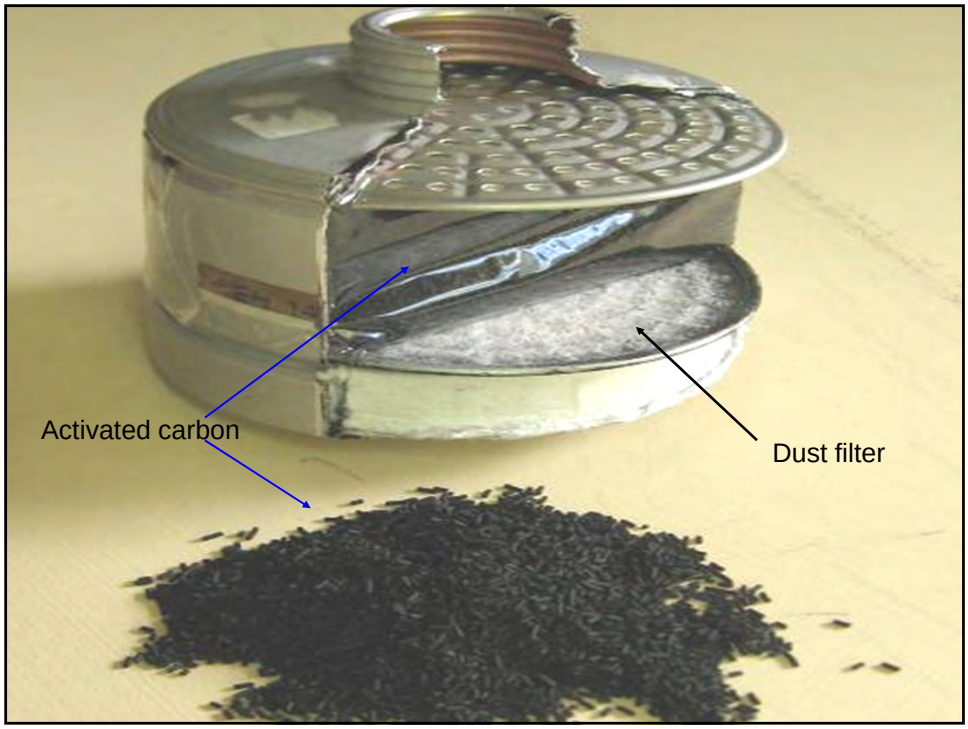
Check ‘use-by’ date

Use canister strictly in accordance with manufacturers instructions

Avoid high concentrations of fumigant as the canister can become quickly saturated and ineffective

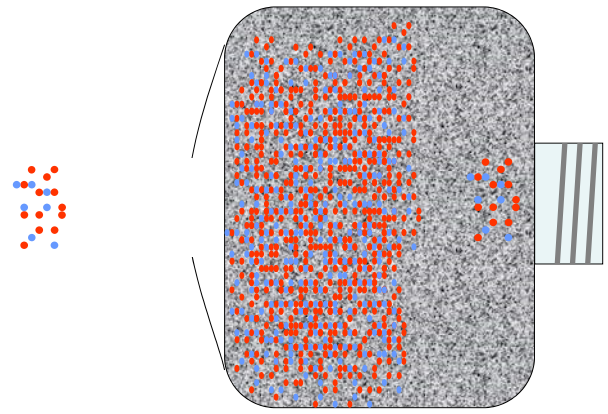
RESPIRATORY FILTERS
DESIGN AND CONSTRUCTION





Gas Canister Usage

Australian Government
Australian Quarantine and Inspection Service



Record of Use

Australian Government
Australian Quarantine and Inspection Service

Date/Time Used	Length of Time Used	Time Remaining (Max. use 40 mins)
18/05/07 – 11:30am	10	30
18/05/07 – 06:00pm	30	0
	DISCARD CANISTER	

Fitting a Full-face Respirator

Australian Government
Australian Quarantine and Inspection Service

Procedure for putting on a respirator:

- Ensure valves are clean and operating properly
- Check time left on the canister
- Check canister for damage
- Adjust straps for a good fit
- Block inlet and check retention against face for 10 seconds
- Ensure there is an air tight seal between the face and mask

Other PPE

Australian Government
Australian Quarantine and Inspection Service

Clothing:

- Loose fitting long sleeve shirt and trousers or overalls
- Stout shoes or boots
- Safety vest
- Safety hat (if a site requirement)

Other Safety Precautions

Australian Government
Australian Quarantine and Inspection Service

Always work in pairs

Check site emergency procedures

Emergency medical help

Australian Government
Australian Quarantine and Inspection Service

THE FUMIGATION SITE

DEPARTMENT OF AGRICULTURE, FISHERIES AND FORESTRY

Site Selection

Australian Government
Australian Quarantine and Inspection Service

Selecting the fumigation site:

- The floor of the fumigation enclosure must be
  - Smooth, flat and free of cracks and drains
  - Impervious to methyl bromide (or use a gas proof floor sheet)
- Access to power, water and lighting
- Large enough to accommodate risk area
- Allow for safe and effective ventilation
- Sheltered from strong winds if possible

Site Risk Assessment

Australian Government
Australian Quarantine and Inspection Service

Carry out a risk assessment:

- Can the fumigant be applied and vented safely
- Proximity of occupied buildings and public areas
- Are site personnel protected
- Wind direction
- Secured from unauthorised entry
- Emergency procedures at the site

Continually re-assess the risk

Australian Government
Australian Quarantine and Inspection Service

CONSIGNMENT – SUITABILITY FOR FUMIGATION

DEPARTMENT OF AGRICULTURE, FISHERIES AND FORESTRY

Effect of Methyl Bromide

Australian Government
Australian Quarantine and Inspection Service

Issues may arise when fumigating the following commodities with methyl bromide:

- Flour, oil seed & nuts
- Iodized salt and baking soda
- Items containing sulphur compounds, e.g. leather, wool & feathers
- Natural rubber products
- Photos & photographic chemicals

Ref: AQIS Methyl Bromide Fumigation Standard - Appendix 3

Free Airspace

Australian Government
Australian Quarantine and Inspection Service

The goods must be stacked to allow adequate air circulation for the even distribution of gas

350mm minimum total airspace:

- 200mm above
- 50mm below
- Remainder between and at the sides

If there is insufficient airspace:

- Re-pack the container
- Unpack the container and fumigate as a stack

Gas Penetration

Australian Government
Australian Quarantine and Inspection Service

Effective gas penetration may be prevented by:

- Timber thickness greater than 200mm
- Impervious coatings such as paint, lacquers, laminates and veneers
- Impervious packaging such as plastic wrapping (refer to AQIS Wrapping and Perforation Standard)


CONSORT
Lloyd's Register
CONTAINER CERTIFICATION SCHEME
CORTEN STEEL CONTAINER
480 KGS
200 LBS
130 KGS
920 LBS
250 KGS
280 LBS
2 CUM
10 CUFT
CIMC


BOX:23
BOX:22

Australian Government
Australian Quarantine and Inspection Service

SHEETING THE ENCLOSURE

DEPARTMENT OF AGRICULTURE, FISHERIES AND FORESTRY

Preparing to Sheet

Australian Government
Australian Quarantine and Inspection Service

Setting up the enclosure:

- Open the doors of the container and secure them
- Clear the site floor of debris
- Pad any sharp corners
- Install in the enclosure:
  - Monitor tubes (label tubes)
  - Supply pipes
  - Fans (check if fans work)
  - Heaters (if required, check if heaters work)

Installing Monitoring Tubes

Australian Government
Australian Quarantine and Inspection Service

Setting up the monitor tubes:

- Monitoring tubes should preferably be crush proof nylon, hydraulic tubing or similar
- The internal diameter of the tubes should fit snugly with the sampling probe of the gas monitor being used
- Secure the tubes in place
- Label the tubes according to their location
- Extend outside the risk area

Gas Supply Pipes

Australian Government
Australian Quarantine and Inspection Service

Setting up the supply pipes:

- Internal diameter the same or larger than the vaporiser coil
- Position to get the best gas circulation
- 2 metres from the monitoring tubes
- Seal and leave in place when finished
- At least one per container
  - use more than one when fumigating larger stacks

Multiple Supply Pipes

Australian Government
Australian Quarantine and Inspection Service

To create a balanced system:

- Internal diameters must be the same
- Each branch must be the same total length
- Gas can be released simultaneously

If the system is not balanced:

- Release an equal proportion of gas through each pipe in turn

Cap any unused manifold points


22G1
EVERGREEN
GROSS
TARE
NET
CUBE

Fumigation Sheet Requirements

Australian Government
Australian Quarantine and Inspection Service

Impervious to methyl bromide

- Permeability less then 0.02 g/m^2 per day
  - material
  - thickness

Easy to handle

- weight
- flexibility
- size

Treat with care

- durable
- can they be repaired

Creating a Gas Tight Enclosure

Australian Government
Australian Quarantine and Inspection Service

How to set up a gas tight enclosure:

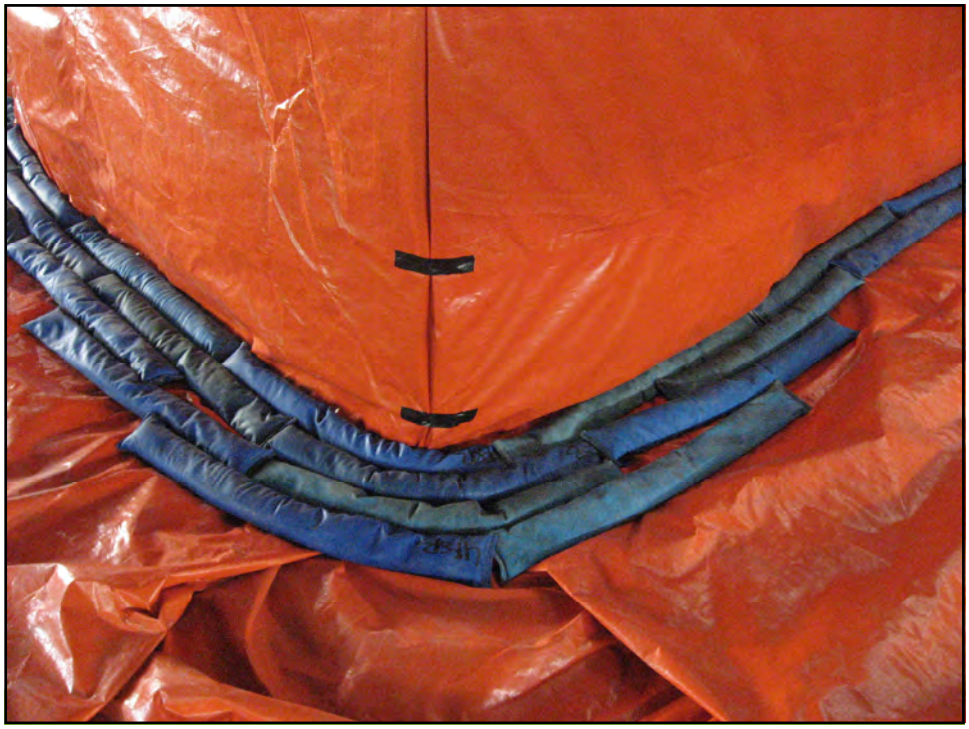
- Suitable fumigation floor
- Impervious sheet in good condition
- Fold and flatten the sheet around the corners
- Roll and secure the corners
- Use sand snakes to hold down
- Pay particular attention to where the tubes, pipes and leads exit the enclosure
- Belly rope to reduce sheet flapping

Sand Snake Placement

Australian Government
Australian Quarantine and Inspection Service

Sand snakes:

- At least two rows around the enclosure
- Laid like brick work
- Do not leave any gaps
- Lay directly against the container
- Use more around the corners
- Leave exposed so that they can be inspected by a quarantine officer



Sand Snake Specifications

Australian Government
Australian Quarantine and Inspection Service

Sand snakes should be:

- Filled with clean dry sand
- Only 65 – 75% full
- Between ½ - 1 ½ metres in length
- Made of durable and flexible material
- Free from sharp edges that may damage the sheet

Measure the Enclosure Volume

Australian Government
Australian Quarantine and Inspection Service

Volume of a sheeted enclosure:

- Measure the external dimensions
- Measure at the widest, tallest and longest part
- Measure the volume of the enclosure each time

Australian Government
Australian Quarantine and Inspection Service

ESTABLISHING A RISK AREA

DEPARTMENT OF AGRICULTURE, FISHERIES AND FORESTRY

Risk Area

Establish a risk area:

- Outdoors
  - A minimum 3 metre risk area is required around the entire fumigation enclosure
- Inside a building
  - a minimum 6 metre risk area is required around the entire fumigation enclosure
- Fumigation risk areas must be marked with a physical barrier and warning signs

Risk Area (cont.)

The risk area should be in force:

- From the time the gas is ready to be applied
- Until the enclosure has been ventilated to below the TLV

When the risk area is in force:

- A respirator must be worn when inside the risk area
- Two people wearing PPE when one or more people are working within the risk area

Increase the size of the risk area if appropriate


ERTIFIED


DILARANG MASUK
BERBAHAYA, GAS BERACUN
FUMIGASI DENGAN METIL BROMIDA
KEEP OUT
DANGER, POISONOUS GAS
FUMIGATION WITH METHYL BROMIDE
Fumigator
Alamat :
Address
Phone :
Tanggal Fumigasi :
Date Of Fumigation
THIS SEALED PLACE IS UNDER FUMIGATION
Fumigant used
Hrs.
Time.
Time.
FUMIGATED BY
Tel :
FAX :

Australian Government
Australian Quarantine and Inspection Service

APPLYING THE GAS

DEPARTMENT OF AGRICULTURE, FISHERIES AND FORESTRY

Vaporising Methyl Bromide

Australian Government
Australian Quarantine and Inspection Service

Methyl bromide MUST be released into the fumigation enclosure AS A HOT GAS because:

- Faster circulation
- Faster penetration
- No liquid methyl bromide

The water must be kept above 65˚ C

- A large water capacity and good heating source will assist this process
- Slow the rate of gas release if the water temperature drops too low

Vaporiser Specifications

Australian Government
Australian Quarantine and Inspection Service

It is recommended that:

- The coil is made from copper and be a minimum of 12 metres long by 12 mm in diameter
- Secure fittings are used for all connections
- The heat source is capable of heating the water to boiling in the time it takes to sheet the enclosure

Preparing to Apply the Gas

Australian Government
Australian Quarantine and Inspection Service

Before applying the gas:

- Turn on fan(s) (15 minutes prior to applying gas)
- Turn on heaters (if required) to raise the temperature of the enclosure above 10˚ C
- Open the vaporiser manifold valve(s) leading to the fumigation enclosure; unused valves should be closed

Preparing to Apply the Gas (cont.)

Australian Government
Australian Quarantine and Inspection Service

Do a final check:

- No holes or tears in the sheet
- Water in the vaporiser is boiling
- The fans are operating
- There are no unprotected personnel in the risk area

Put on your PPE (test procedures)

- Connect the supply system and check that the fittings are secure

Scales and Dispensers

Australian Government
Australian Quarantine and Inspection Service

The amount of methyl bromide released into the enclosure must be measured using:

- Scales
- Graduated dispenser
- Cans


IN-34


BROMIDE
TOXIC
MSA

Applying the Gas

Release a small amount of gas into the system

- Check the fittings and pipes for leaks and fix if necessary

Release the dose into the enclosure

- Do not open the valve quickly
- Monitor the water temperature of the vaporiser during the release of the dose
- Adjust the rate of gas release to ensure that the water temperature does not fall below 65° C

Leak Detection Equipment

Leak detectors are required to ensure methyl bromide does not leak from:

- The cylinder
- Vaporiser, supply pipes and connections
- The enclosure
  - where the sheet meets the floor
  - corners
  - exit point of the hoses and leads
  - repairs or joins

Leak Detectors

Australian Government
Australian Quarantine and Inspection Service

Halide lamps:

- Difficult to read in daylight
- The copper element must be kept clean

Electronic leak detectors:

- Convenient and easy to use
- Manufacturers include:
  - Riken
  - Uniphos
  - Rae Systems

Start of the Fumigation

Australian Government
Australian Quarantine and Inspection Service

Turn off the fans before taking the first readings

If the readings are at or above the standard concentration and in equilibrium:

- This is the **start time** of the exposure period
- Record the readings and the time

If the readings are above the standard concentration and NOT in equilibrium

- Restart the fans and continue to circulate the gas
- Retake the readings

End of Fumigation

Australian Government
Australian Quarantine and Inspection Service

ALL the concentrations are at or above the Standard

- Fumigation OK
- Record the readings and the time
- Start ventilation

One or more concentrations are below the Standard but above the minimum

- Top up
- Extend by 4 hours
- Retake the final concentration readings

One or more concentrations are below the minimum

- Fumigation failed

Australian Government
Australian Quarantine and Inspection Service

VENTILATION

DEPARTMENT OF AGRICULTURE, FISHERIES AND FORESTRY

Ventilating the Enclosure

Australian Government
Australian Quarantine and Inspection Service

Conduct a risk assessment:

- Ensure the risk area is free of unprotected personnel
- Check down-wind area – 50 metre minimum

Put on PPE

Raise the corners of the sheet and secure

- Fans will assist ventilation

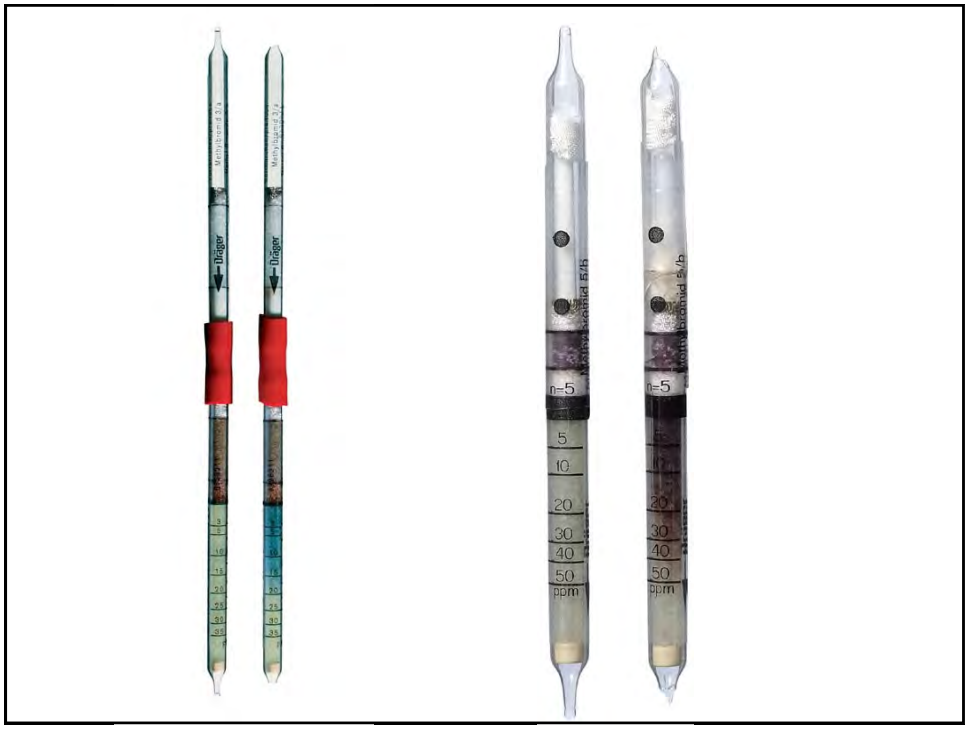
Checking TLV

Australian Government
Australian Quarantine and Inspection Service

The enclosure must be free of unsafe levels of gas

- Check the TLV
  - 5ppm for methyl bromide in Australia
- Equipment for checking TLV
  - Stain tubes
  - Electronic instruments
- Wait 30 minutes and recheck the TLV

Ventilation and checking for TLV may need to be repeated several times until the concentration stays below 5ppm


Dräger
Dräger
n=5
n=5
5
10
20
30
40
50
ppm
5
10
20
30
40
50
ppm


Dräger
Dräger

Completing the Fumigation

Australian Government
Australian Quarantine and Inspection Service

End of the fumigation:

- The fumigation is only complete when a TLV of 5ppm or less has been achieved
- Complete the documentation
  - A Gas Clearance Certificate can only be issued at this point
  - Fumigation certificate
  - Record of fumigation
- Consignment released from fumigator's control

Australian Government
Australian Quarantine and Inspection Service

Course Review

DEPARTMENT OF AGRICULTURE, FISHERIES AND FORESTRY

Course Review

Australian Government
Australian Quarantine and Inspection Service

Preparation

- Documentation
- Suitable equipment
- Forecast minimum temperature

Site

- Floor must be impervious to methyl bromide
- Enough room for the risk area
- Safely ventilate

Course Review

Australian Government
Australian Quarantine and Inspection Service

Commodity

- Must not have impervious wrappings or coatings
- Sufficient free airspace
- Not adversely affected by methyl bromide

Setting up the enclosure

- Number and location of monitor lines
- Supply pipes
- Fans
- Must be gas tight

Course Review

Australian Government
Australian Quarantine and Inspection Service

Calculating the dose

- Use external dimensions of sheeted enclosures
- Adjust for temperature below 21˚ C
- Adjust for chloropicrin if used
- Round up after the calculations have been done

Applying the fumigant

- Must use a vaporiser
- Release slowly so the water remains on the boil
- Run the fans to circulate the gas
- Check for leaks

Course Review

Australian Government
Australian Quarantine and Inspection Service

Monitoring

- Start point for ALL fumigations
  - at or above the standard and in equilibrium
- End point for ALL fumigations
  - at or above the standard
- Mid point for fumigations of 48 hours or more

Topping up

- During
- At the end
  - Extend the fumigation by 4 hours

Course Review

Ventilation

- TLV - 5ppm
- Detector tubes or electronic equipment that can accurately measure down to 1ppm

Documentation

- Record of fumigation
- Fumigation certificate

Thank you

Appendix E

Appendix E Report for March 10–22 Input to Solomon Islands

Operational Procedure - Fumigation with Methyl Bromide

Certain information within this procedure has been reproduced from the AQIS Methyl Bromide Fumigation Standard Version 1.7 (November 2011)

Table of Contents

1. PURPOSE

The purpose of this procedure is to describe -

(a) the principles of operation and standards required to conduct a methyl bromide fumigation treatment; and

(b) the responsibilities and actions of personnel when conducting a methyl bromide fumigation treatment.

2. SCOPE

This procedure covers all certification of methyl bromide fumigation treatments conducted by a Business approved by the Solomon Islands Agriculture Quarantine Service (SIAQS).

This procedure does not abrogate or override the responsibility of the Business to comply with local regulations or legislative requirements.

Certification of methyl bromide fumigation treatments under this operational procedure may not be an accepted quarantine entry condition to all overseas markets.

Some overseas markets may require additional quarantine certification as a condition of entry. It is the responsibility of the Approved Business to ensure compliance with all applicable quarantine requirements.

For specific information relating to general maintenance of gas measuring and monitoring devices, the Approved Fumigator should consult the relevant manufacturer's operating manual.

3. REFERENCES

AQIS Methyl Bromide Standard	AQIS Methyl Bromide Fumigation Standard Version 1.7 November 2011

4. DEFINITIONS

Approved Fumigator	A person who has attended the AFAS Methyl bromide Fumigation Training or an equivalent standard of training and has been assessed as competent.
AFAS	Australian Fumigation Accreditation Scheme
Approved Business	Means a business or individual responsible for the operation

Calibration	To check, measure or adjust against a known measurement or standard.
Chamber	Enclosure made from gas-proof material specifically designed for the purpose of fumigation.
Chloropicrin*	A strong smelling chemical commonly added to the odourless methyl bromide to indicate the presence of gas (AQIS Methyl Bromide Standard)
Concentration*	The amount of fumigant present at a certain point in time in the fumigation enclosure, usually expressed as grams per cubic metre (g/m3)
Dosage*	The calculated amount of fumigant applied to a fumigation enclosure, usually expressed as kilograms or grams.
Fumigant*	A chemical, which at a particular temperature and pressure can exist in a gaseous state in sufficient concentration and for sufficient time to be lethal to insects and other pests.
Fumiscope®	An instrument which measures the concentration of fumigant gas in a space under fumigation.
Gas equilibrium*	At the start of fumigation, where the gas concentration at each monitoring point is within 15% of the lowest reading. AQIS only accepts that a fumigation exposure has started AFTER it has been demonstrated that equilibrium has been achieved and concentrations at all monitoring points are at or above the standard.
MiniRAE®	Handheld instrument used for Methyl Bromide leak detection
Minimum ambient temperature	
Monitoring tube*	A relatively small diameter tube used to withdraw a sample of gas/air mixture from within a fumigation enclosure for measuring fumigant concentration.
Pa	Pascal - a unit of pressure.

Phytotoxic*	Poisonous to plants
Threshold Limit Value*	TLV is the maximum concentration of fumigant that a worker can be repeatedly exposed to in the workplace without harmful effects. This figure is based on an 8 hour day, 40 hour working week and is currently 5ppm in Australia.

* Definition from AQIS Methyl Bromide Standard Version 1.7 November 2011

5. RESPONSIBILITY

The Business Principal (or delegate) is responsible for -

- training staff in their responsibilities and duties under this Operational Procedure;
- ensuring the Approved Fumigator complies with their responsibilities under this Procedure;
- ensuring that all fumigation treatments are carried out in accordance with this Operational Procedure;
- ensuring all fumigations are performed by an Approved Fumigator;
- ensuring the gas monitoring device and detector are calibrated; and
- if applicable, ensuring weighing scales are calibrated at least every 6 months.

The Approved Fumigator is responsible for -

- ensuring that all fumigation treatments are carried out in accordance with this Operational Procedure;
- maintaining the fumigation equipment;
- determining the rate and dosage of fumigant required for each fumigation;
- if applicable, maintaining weighing scale calibration records;
- maintaining fumigation treatment records; and
- ensuring fumigation treatments comply with local government, environmental and workplace health and safety authorities.

6. Requirement

6.1 Dosage

Fumigation with methyl bromide by an Approved Fumigator at a rate that conforms to the entry requirements of the destination country –

*Common Standard Dosage for Methyl Bromide Fumigation

Pest/Commodity	Required Concentration
Timber	48g/m^3 at 21° C for 24 hours at Normal Atmospheric Pressure (NAP)
Giant African Snail	128g/m^3 at 21° C for 24 hours at NAP
Khapra Beetle	80g/m^3 for 48 hours with a minimum concentration of 24g/m^3 after 24 hours at NAP
Stored Product Pest of Quarantine concern	32g/m^3 at 21° C for 24 hours at NAP

*From the AQIS Methyl Bromide Standard Version 1.7 November 2011

6.2 Temperature

The Approved Fumigator shall ensure fumigations are not carried out if the ambient minimum temperature falls below 10° C. The Approved Fumigator shall also ensure the fumigant dosage is compensated for ambient temperatures below 21° C.

The Approved Fumigator shall ensure for each 5°C (or part of 5°C) the temperature is expected to fall below 21 °C, 8g/m³ is added to the dosage, unless otherwise specified by the importing country.

For example, using the standard dosage of 48g/m³ for a 24 hour exposure period, the dosage at:

Temperature	Compensation factor
21 °C and above is	48 g/m^3
16 – 20 °C is	56 g/m^3
11 – 15 °C is	64 g/m^3
10 °C is	72 g/m^3

The fumigation provider must record the temperature information on the fumigation certificate.

Solomon Islands Agriculture Quarantine Service maintain the right to inspect at any time certified product and to refuse to accept a fumigation treatment where the fumigation is found not to conform to specified requirements.

Facilities/locations where methyl bromide treatments are undertaken must comply with the requirements of the local government, environmental and workplace health and safety authorities.

Some quarantine treatments require a higher retention rate than what is specified in the Standard (Appendix 2). In such cases the higher retention rate is the end-point concentration that must be achieved for a successful fumigation.

7. Prior to fumigation

7.1 Fumigation Site Requirements

The fumigation site used to conduct methyl bromide fumigation treatments under this procedure must –

- have a surface impermeable to the fumigant when the fumigation is carried out under gas proof sheets;
- be able to be segregated to minimize any OH&S risks ;
- be well ventilated; and
- have a reliable power supply available.

When the site surface is porous or otherwise unsuitable for conducting a fumigation under gas proof sheets, the Approved Fumigator shall use a floor sheet. Unsuitable surfaces include soil (including cement consolidated soil), sand, base rock and pavers.

7.2 Fumigation Site Risk Assessment

The Approved Fumigator shall perform a risk assessment of the fumigation site prior to undertaking a fumigation. The Approved Fumigator shall ensure -

- the fumigation site can be secured from unauthorized entry;
- the fumigation site is sufficient distance from occupied building and public areas;
- the fumigant can be applied and vented safely; and
- emergency procedures at the site are in place.

The Approved Fumigator shall establish a risk area to a minimum of 3 metres around the fumigation enclosure if outdoors and a minimum of 6 metres around the fumigation enclosure if indoors.

The Approved Fumigator shall ensure signage is placed outside the immediate fumigation area as a warning that a fumigation is being undertaken and the signage will remain there from the time the gas is ready to be applied until the enclosure has been ventilated below the TLV. The signage (minimum A4 size paper) will consist of the following details:

- Skull and crossbones icon
- The wording ‘Danger – Methyl Bromide Fumigation in Progress’
- The dosage rate and duration
- Time and date the fumigation commenced

- Time and date the fumigation is complete
- Fumigator name
- Container number(s) (if applicable)

An example of warning signage to be used when conducting a methyl bromide fumigation is provided in Appendix 3.

The Approved Fumigator shall ensure a full-faced respirator or self-contained breathing apparatus is used when releasing the fumigant and while working within the risk area after the fumigant has been released.

7.3 Fumigation Equipment Maintenance

The Fumigator shall carry out checks (prior to each fumigation) of the fumigation equipment such as gas monitoring devices and gas sampling tubes and valves to ensure they operate effectively and remain free from damage.

7.4 Pressure Testing Requirements (un-sheeted containers)

The Approved Fumigator shall pressure test all un-sheeted containers used for methyl bromide fumigation treatments. A pressure test decay time from 200 to 100 Pa of 10 seconds or more must be achieved to certify that the container is gas-tight.

The Approved Fumigator shall record the gas pressure test details on the Fumigation Record (Attachment 1) and undertake the gas pressure test in accordance with the following -

- Using a finger manifold and pressure gauge (or similar devices), raise the pressure within the container to 250 Pa and then turn off the compressed air supply. The Fumigator must ensure the pressure within the container is not raised to a pressure that may cause damage to the container seals or ventilators.
- The Fumigator must wait until the pressure within the chamber decays to 200 Pa and then record the time taken for the pressure to decay from 200Pa to 100 Pa. This time must be recorded on the Fumigation Record.
- The pressure decay time between 200 Pa and 100 Pa must be 10 seconds or more for the container to meet the AQIS Methyl Bromide Standard.
- Should the chamber not meet the minimum pressure decay time, the Fumigator must release the pressure from the chamber and rectify the cause as to why the chamber is not holding the required pressure.

Containers that give a pressure decay time from 200Pa to 100 Pa of 10 seconds or more are considered gas-tight. Such containers may be fumigated with methyl bromide without enclosing them under gas proof sheets. Where the pressure decay time is less than 10 seconds, the container must be enclosed in gas proof sheets.

Specific information relating to finger manifold design can be located in Appendix 6 of the AQIS Methyl Bromide Standard.

7.5 Sheet Fumigation

The Approved Fumigator shall fumigate all containers under gas proof sheets unless it can be demonstrated the container complies with the pressure testing requirements (refer 7.4).

Prior to performing a sheet fumigation, the Approved Fumigator shall visually inspect the sheet(s) for tears, holes and abrasions. The Approved Fumigator shall either repair or replace sheets that have holes, are torn or have abrasions that would cause them to leak.

The Approved Fumigator shall ensure the sheet(s) used for a sheet fumigation are free from any defects (faulty seams/welds, tears or holes).

Specification: sheets for methyl bromide fumigation treatments must have a permeability of less than 0.02 grams per square metre (of fumigation sheet) per 24 hours (multiplied by the dose g/m^3).

The Approved Fumigator shall ensure materials such as annealed polypropylene sheets, pool liners and thinly coated woven materials are not used for sheeted fumigations.

For any sheet fumigation, the Approved Fumigator shall ensure:

- Fumigation sheets must be positioned or protected with suitable padding to avoid any sharp corners or objects that might damage them;
- Sheets must be arranged so that there is at least 500 mm of sheet extending beyond the limit of the seal;
- In high winds, ropes or belts must be used to hold fumigation sheets in place to prevent them from flapping loose;
- Corners and areas where ropes, electrical leads, gassing pipes and monitoring tubes emerge from between or under the sheets must be tightly sealed;
- Loose fumigation sheeting on corners of stacks must be secured by folding, rolling and clipping to prevent blowing out in the wind; and
- Where more than one container is being fumigated under sheet, at least one door of each container must be fully opened.

When using sand snakes, the Approved Fumigator shall ensure a minimum of two rows of sand snakes must be placed side by side with joins overlapping (like brickwork), and laid flush against the enclosure to create a continuous seal

When using water snakes the Approved Fumigator shall ensure a single, continuous water snake must be laid flush against the enclosure to create a continuous seal

7.6 Calculation of Fumigation Enclosure Volume

The volume of the space to be fumigated for an enclosed un-sheeted container is the internal volume of the shipping container space. When fumigating sheeted containers, the measured external dimensions of the sheet must be used. The fumigation enclosure volume

is to be calculated using a metric measuring tape to determine length, width and height with the volume expressed in cubic metres (m^3).

Where an enclosed un-sheeted container is used for fumigation, the volume of any ducting or fans external to the container, which are not sealed from the chamber during fumigation, must also be included in calculation of the chamber volume.

Details of chamber volume and fumigant dosage rates shall be recorded on the Fumigation Record (Appendix 1) for each fumigation.

The following calculation is to be used to determine the volume of a fumigation enclosure in cubic metres (m^3) -

enclosure height (m) x enclosure length (m) x enclosure width (m) + external ducting volume (m^3) = **total enclosure volume (m^3)**

For example (a standard 20 foot container) -

Container Height = 2.38 metres / Chamber Length = 5.9 metres / Chamber Width = 2.35 metres

Chamber Volume = 2.38 x 5.9 x 2.35 = 33.0 m^3 (always round up)

External Ducting Volume = 0.0 m^3

Total Chamber Volume = 76.0 m3 + 0.0 m3 = **33.0 m^3** (always round up)

Preparing and Sealing the Enclosure

7.7 Preparing the Enclosure (Free Airspace)

The Approved Fumigator shall ensure that adequate air space is maintained between stacked goods to allow effective circulation of the fumigant. The AQIS Methyl Bromide Fumigation Standard advises there should be at least 350mm of free airspace in total with 200 mm free airspace above the goods, 50 mm below the goods and the remaining 100 mm at the sides and between the goods.

The Approved Fumigator shall either have the container re-packed if there is insufficient airspace within the container or have the container unpacked and fumigate the goods as a stack.

7.8 Packaging

The Approved Fumigator shall ensure the goods to be fumigated are not coated with materials that are impervious to methyl bromide. Impervious surfaces and coatings such as paints, lacquers, veneers may prevent the effective penetration of methyl bromide. The Approved Fumigator shall also ensure impervious wrappings such as plastic, tarred or waxed papers and aluminium foil are perforated, cut or removed prior to fumigation to allow the effective penetration of methyl bromide.

If the consignment cannot be inspected for impervious materials due to inaccessibility, the Approved Fumigator shall either rely on a packing declaration from the packer or other party that packed the container or advise the business exporting the goods that the container will need to be unpacked for inspection prior to fumigation. The Approved Fumigator shall not undertake a fumigation until the status of the packaging has been established.

When undertaking fumigations of untreated timber products, the Approved Fumigator shall ensure the timber products have at least one physical dimension which is less than 200mm thick.

Timber must be separated by a minimum of 5mm of air space in one dimension every 200mm

7.9 Placement of Fumigant Supply Lines

The Approved Fumigator shall place the fumigant supply lines within an enclosure to effectively introduce and allow dispersal of the gas around the commodity. The Approved Fumigator shall ensure the fumigant supply lines are as far as practicable from the fumigant monitoring tubes.

Where multiple containers are under one enclosure (sheeted fumigation), the Approved Fumigator shall place a fumigant supply line in each container.

The Approved Fumigator shall take precautions to prevent any liquid fumigant coming in contact with the commodity being fumigated, therefore impermeable sheeting or a tray may be used to cover the commodity near to where the fumigant supply valve is located. The covering should not touch the commodity and must be placed to allow the fumigant to circulate around the commodity.

The Approved Fumigator shall ensure that adequate fan circulation is provided to circulate the fumigant and the commodity does not obstruct the fumigant supply outlet when loaded.

To prevent leakage from the fumigant supply lines, the Approved Fumigator shall:

- make a gas-tight seal around every supply line exit point from the enclosure; and
- seal the exposed ends after the fumigant has been introduced into the enclosure.

7.10 Placement of Fumigant Monitoring Lines

The Approved Fumigator shall monitor all fumigations. For enclosures larger than 30 cubic metres (equivalent of the average internal volume of a 20 ft shipping container), a minimum of three fumigant monitoring lines must be positioned with the enclosure. For enclosures smaller than 30 cubic metres, a minimum of one fumigant monitoring line must be placed at the top centre of the commodity being fumigated.

The Approved Fumigator shall place the fumigant monitoring lines in the fumigation enclosure as follows:

ONE container must have one monitoring tube placed:

- at the top back of the commodity – as far from the doors as possible;
- as close to the centre of the commodity as is practicable;
- at the front base of the commodity.

TWO containers (in the one enclosure) must have one monitoring tube placed:

- at the top centre of the commodity in each container;
- at the front base of the commodity in either container.

THREE containers or more (in the one enclosure) must have one monitoring tube placed:

- at the top centre

Specification: fumigation monitoring lines should be crush proof nylon or hydraulic tubing or similar (3mm external diameter and approximately 2mm internal diameter)

The Approved Fumigator shall ensure the fumigant monitoring lines maintain a free flow mixture of gas/air, have no kinks or blockages and extend beyond the boundary of the risk area.

7.11 Calculation of Fumigant Dosage

Common fumigant dosage rate are specified in the Requirement. It is the responsibility of the Approved Business consigning the product to ensure compliance with all applicable quarantine requirements.

To determine the amount of methyl bromide (weight) required in grams (g) to be introduced into the enclosure, the following formula must be applied:

Enclosure volume x dosage rate = grams of methyl bromide required

For example (a standard 20 foot container)

76.0 m3 x 32g/m3 = **2432 g methyl bromide**

The Fumigator shall maintain records of the total amount of methyl bromide applied for each fumigation on the Fumigation Treatment Record.

8. Application of Fumigant

8.1 Sealed System or Loss of Weight System

Sealed system - The Fumigator measures out the required amount of fumigant into the volumetric measuring cylinder. After the required amount of fumigant has been decanted and checked the fumigant is introduced into the chamber via the vaporiser.

Loss of weight system -The Fumigator measures out the required amount of fumigant by the loss of weight in the dispensing cylinder.

To operate this method, the dispensing cylinder is placed onto scales to allow the weight of the cylinder to be determined before application of the fumigant.

The Fumigator must tare off the weight of the required amount of fumigant on the dispensing cylinder and open the valve to apply the required amount until the cylinder is at the tared weight.

8.1 Calibration of Weighing Scales

Scales used for the Loss of Weight System must be calibrated at least every six months or at intervals recommended by a recognized testing authority.

The business shall maintain results of weighing scale calibration checks.

Weighing scale calibration records shall record the following information-

- date of calibration;
- the identification of the scales calibrated;
- confirmation that the equipment is accurate to within ± 1 percent of the minimum dosage (g) of methyl bromide used for the chamber; and
- the name of the officer responsible for conducting the calibration check.

8.2 Vaporiser/Volatiliser

Although methyl bromide has a low boiling point and will vaporise when released at temperatures above 4.0^{o} C, liquefaction may occur as the gas is released from the delivery cylinder. For this reason a vaporiser or volatiliser must be used to introduce the methyl bromide as a hot gas. A suitable device has part of the copper delivery tube coiled and submerged in hot water.

The Fumigator, prior to fumigation, shall ensure the water in the vaporiser unit is raised to near boiling point (boiling point if safe to do so) and maintained at this temperature throughout the delivery of the gas into the chamber. The Fumigator shall monitor the temperature of the fumigant entering the chamber by periodically holding the gas supply pipe from the vaporizer to the fumigation chamber. Should the pipe not feel warm/hot throughout the period in which the gas is introduced, the Fumigator shall stop the introduction of the gas until the water in the vaporiser is re-heated to near boiling point.

8.3 Mixing of Fumigant

To ensure adequate mixing of the fumigant, fans shall be used to disperse the gas throughout the enclosure and thereby enhance the penetration of the fumigant. Once the gas is evenly distributed it maintains that condition.

The use of high velocity/high volume fans for periods longer than 15 minutes may lead to the fumigant being forced from the enclosure.

The Approved Fumigator shall position the fan(s) to ensure the fumigant is rapidly and effectively distributed throughout the fumigation enclosure. For methyl bromide fumigation in small enclosures, at least one fan must be used. For fumigations in larger enclosures, at least two fans must be used.

The Approved Fumigator shall ensure where multiple containers are fumigated under the same sheet, fans are placed in each container.

The Fumigator shall determine the effective mixing of methyl bromide by monitoring gas concentrations at all monitoring points following the introduction of the gas. Note the gas monitoring must be undertaken when the fan(s) are turned off. If all concentration levels cannot be equalized to within 15% of the lowest reading (equilibrium), the Fumigator shall redistribute the fumigant by turning on the fan for a further period of time. Should equilibrium not be achieved, the fumigation is deemed to have failed and the Fumigator shall identify and rectify the cause and re-dose the chamber.

The fumigation cannot commence if the fumigant levels drop below the standard concentration (A) as displayed in Appendix 2 (Methyl Bromide Fumigation Ready Reckoner).

The Fumigator shall record the gas concentrations at all monitoring points following the introduction of the gas and record the results on the Fumigation Record. The Fumigator shall also record the calculations made to demonstrate equilibrium has been achieved.

8.4 Testing for Leaks

The Approved Fumigator shall release a small amount of the fumigant into the enclosure prior to the release of the total dose. Following the small amount of the fumigant being released into the enclosure, the Approved Fumigator shall check all joints and connections of the supply system for leakage using a suitable gas monitoring device capable of reading methyl bromide concentrations to ppm. Following this check, and if no leaks are detected, the Approved Fumigator shall release the total amount of fumigant into the chamber.

Once all the fumigant has been released into the chamber, the Approved Fumigator shall test the enclosure for leaks using a suitably sensitive gas detection device. The Approved Fumigator shall check the following areas associated with the chamber -

- chamber door sealing points (unsheeted container);
- fumigant supply lines;
- sheet joins; and
- fumigant monitoring lines.

The Approved Fumigator shall repair any detected leaks immediately. If leaks are detected that cannot be repaired the Approved Fumigator must abort the fumigation, record the result on the Fumigation Record, vent off all fumigant, ensure gas freedom and rectify the enclosure leak prior to re-gassing.

8.5 Monitoring Fumigant Concentration

Effective fumigation is dependent on maintaining a satisfactory level of fumigant within the enclosure during the fumigation. Methyl bromide concentrations must be measured on at least two occasions during the fumigation exposure period; at the start of the fumigation exposure period and at the end of the fumigation exposure period. Table 1 provides a summary of the monitoring times.

Table 1: Monitoring Times

Exposure Period	Start-point monitoring	Mid-point monitoring	End-point monitoring
Less than 48 hrs	*Take the first reading once it is reasonable to expect equilibrium has been achieved.**	*Not required but may be undertaken*	*End of exposure period*
48 hours or more	*Take the first reading once it is reasonable to expect equilibrium has been achieved.**	*24 hours after start and as required*	*End of exposure period*

* Equilibrium can be achieved more quickly if:

(1) There is good free air space in the chamber.

(2) There are sufficient fans and they are positioned to best effect.

(3) The methyl bromide is applied as a hot gas.

Start Point Monitoring

The Fumigator shall take a fumigant concentration reading once it is reasonable to expect equilibrium has been achieved. To measure the fumigant concentration at the start point monitoring, the Fumigator shall ensure the monitoring device is warmed up in accordance with the manufacturers directions.

The Fumigator shall commence taking fumigant readings at each of the three monitoring ports. To take the readings the Fumigator shall:

- ensure the sampling tube on the monitoring port is free of dirt, water and other contaminants;
- connect the sampling tube on the monitoring port to the gas monitoring device, and allow the pump (or use bellows) to draw a sample into the gas monitoring device;
- wait until the gas monitoring device reading is consistent prior to recording the fumigant concentration level on the Fumigation Record; and
- repeat the same steps for the other two monitoring ports.

The fumigation exposure period begins when the methyl bromide concentrations at all monitoring points **ARE AT OR ABOVE THE STANDARD AND HAVE REACHED EQUILIBRIUM** (when all readings are within 15% of the lowest reading).

When monitoring indicates that the required concentration will not be achieved the Approved Fumigator shall vent off all fumigant, ensure gas freedom and then inspect the chamber for the possible cause. Topping up the fumigant is not permitted.

When the cause has been rectified the produce must be re-gassed at the specified rate prior to certification. However there may be a risk of excessive residue of fumigant in the product, depending on the amount absorbed by the product in the initial treatment.

All instruments used for measuring and monitoring methyl bromide concentrations must be fit for the purpose, in good working order and calibrated on a regular basis according to the manufacturers instructions.

All instruments used for measuring and monitoring methyl bromide concentrations within a fumigation enclosure must be fitted with a moisture absorption filter, an appropriate carbon dioxide (CO2), or other filter, as required by the manufacturer.

End Point Monitoring

Methyl bromide concentrations at all monitoring points must be **AT OR ABOVE THE STANDARD** at the end of the fumigation period before fumigation can be declared successful. To measure the fumigant concentration at the end point monitoring, the Fumigator shall repeat the steps for taking the fumigant readings at the start point monitoring.

Some quarantine treatments require a higher retention rate than what is specified in the Standard (Appendix 2). In such cases the higher retention rate is the end-point concentration that must be achieved for a successful fumigation.

When monitoring indicates that the required concentration has not been achieved the Fumigator shall vent off all fumigant, ensure gas freedom and then inspect the chamber for the possible cause. Topping up the fumigant is not permitted.

When the cause has been rectified the produce must be re-gassed at the specified rate prior to certification. However there may be a risk of excessive residue of fumigant in the product, depending on the amount absorbed by the product in the initial treatment.

8.6 Topping Up

Topping-up shall only be undertaken when fumigant concentrations are above the minimum top-up level at all monitoring points. When topping-up is done after the end point monitoring the exposure period must be extended for a further 4 hours and final monitoring readings must be taken and recorded.

Topping-up is not an acceptable action solely to compensate for inadequate operational practices e.g. use of torn or unsuitable fumigation sheets or fumigation site surface.

Topping-up must only be undertaken when fumigant concentrations are above the minimum concentration to allow top-up (B) at all monitoring points.

Fumigant levels must not be topped-up above the maximum top-up concentration (C).

In addition to the monitoring times in TABLE 2 monitoring must take place at intervals not greater than 6 hours apart throughout the fumigation period if it is suspected that the relevant final concentration will not be achieved. Monitoring at the set times must still be done.

Topping-up is not an option for fumigations of less than 12 hours

9. Completion of Fumigation

9.1 Venting

After treatment the Approved Fumigator shall ventilate the enclosure to extract all of the remaining gas and ensure that the concentration of methyl bromide is below the 5 ppm Threshold Limit Value (TLV).

The 5 ppm TLV provided meets relevant Occupational Health & Safety requirements for Australia. The TLV may not be the same for the Solomon Islands.

Venting can be done by either natural aeration or forced ventilation using fans or other appropriate equipment.

Before measuring TLV, the Approved Fumigator shall switch off all fans being used for aeration of the fumigation enclosure. Where containers have been sheeted, the sheet must be fully removed prior to testing for TLV. Where containers have been fumigated, fumigant concentrations should be sampled from one or more representative points from within the fumigation enclosure. After taking the samples the fumigator will close the enclosure and leave the risk area.

After 30 minutes of ventilation, the Approved Fumigator should reopen the enclosure and check the fumigant concentration inside the enclosure. If the concentration is less than or equal to 5 ppm, the enclosure may be declared safe. If concentrations of fumigant above 5 ppm are detected, the Approved Fumigator should leave the risk area, re-ventilate using fans or naturally ventilate the enclosure for a further period of time and recommence the TLV check procedure. This process should be repeated until all sections of the fumigation enclosure have been proved safe for re-entry.

The equipment used for measuring methyl bromide concentrations in 'risk areas' and post treatment clearance of enclosures must be fit for the purpose and capable of detecting concentrations of between 1 – 100 ppm v/v.

9.2 Identification and Control of Treated and Untreated Commodities

The Approved Fumigator (where applicable) shall ensure mixing of treated and untreated produce at the facility does not occur.

Examples of acceptable methods of identifying the treatment status of treated and untreated commodities after fumigation include -

(a) locating untreated commodities in a clearly identified and separate area to treated commodities and maintaining separation until dispatch; and

(b) marking each package of the treated commodity in a manner that clearly identifies the commodity as being treated.

Other methods may be used provided that clearly identify and segregate treated and untreated commodities.

9.3 Treatment Records

The Approved Fumigator must record each fumigation using a Fumigation Treatment Record (refer Attachment 1) or similar.

Treatment records must identify -

- the name of the customer;
- start date of the fumigation;
- location of fumigation;
- description of consignment;
- target of fumigation;
- container numbers
- pressure test details;
- chamber volume;
- dosage rate, exposure period, forecast minimum temperature, dosage;
- concentration reading and times at the start, middle (if performed) and end of the fumigation;
- equilibrium calculation
- ventilation details; and
- the Fumigator's name and signature.

The Approved Business or customer shall present the Fumigation Treatment Record to SIAQS when the fumigation treatment is to be endorsed on a phytosanitary certificate.

A copy of the Fumigation Treatment Record is to be maintained by the Approved Business and made available upon request by SIAQS.

Attachment 1

Fumigation Record No_____

Job Details		
Customer Name	Start Date of Fumigation	Location
Description of Consignment		
Target of Fumigation	Container Numbers / Consignment Identification	

Fumigation Details			
Adequate free airspace, no impervious surfaces or wrapping, maximum timber thickness & spacing ☐ Yes ☐ No			
☐ Sheeted Container ☐ Sheeted Stack Size: Qty:			Enclosure Dimensions L H W
☐ Pressure Tested Container ☐ Chamber Decay Time = seconds			Volume = m^3
Specified Dose Rate	Exposure Period	Forecast Minimum Temp	Dosage Rate Used g/m^3
Calculated Dose	Chloropicrin ☐ N/A	Actual Dosage Applied	Time dosing finished

Concentration Readings

Phase	Time of reading	Standard g/m^3	Monitor Line Readings by Location					Equilibrium Calculation	Top-up Dose
			1	2	3	4	5		
Start								%	
								%	
During									
End									

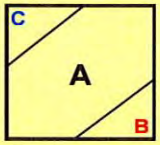
Comments:

Ventilation			
Initial TLV (ppm)	Date & Time Taken	2nd TLV Reading (ppm	Date & Time Taken
Approved Fumigator		**Quarantine Officer (if supervised)**	
Name	Signature	Name	Signature

AQIS Monitoring Ready Reckoner for Methyl Bromide

Australian Government
Australian Quarantine and Inspection Service

Dosing Phase	Initial Dosage	24 g/m³	32 g/m³	40 g/m³	48 g/m³	56 g/m³	64 g/m³	72 g/m³	80 g/m³	128 g/m³	Dosing is complete once ALL the required amount of gas has been applied to the enclosure.
Gas Distribution Phase — Start Point	½ - 1 hr after gas introduction (75% or more of initial dose)	24.0 / 18	32.0 / 24	40.0 / 30	48.0 / 36	56.0 / 42	64.0 / 48	72.0 / 54	80.0 / 60	128 / 96	Start Point is achieved when ALL monitor readings are at or above the Standard AND within 15% of the lowest reading (Equilibrium). The duration of the fumigation is measured from when the Start Point is achieved.
	> 1 hr after gas introduction (70% or more of initial dose)	24.0 / 16.8	32.0 / 22.4	40.0 / 28	48.0 / 33.6	56.0 / 39.2	64.0 / 44.8	72.0 / 50.4	80.0 / 56	128 / 89.6	
Fumigation Phase — Methyl Bromide Concentration After Start Point	2 hrs after start point (60% or more of initial dose)	19.4 / 14.4 / 9.4	24.2 / 19.2 / 14.2	29.0 / 24 / 19.0	33.8 / 28.8 / 23.8	38.6 / 33.6 / 28.6	46.4 / 38.4 / 30.4	51.2 / 43.2 / 35.2	56.0 / 48 / 40.0	84.8 / 76.8 / 68.8	The exposure period commences when the Start Point has been reached. For example, if a 24 hr fumigation reaches Start Point 1 ½ hrs after dosing the fumigation is considered complete 25 ½ hrs after dosing and ALL concentrations are at or above the standard specified for 24 hrs.
	4 hrs after start point (50% or more of initial dose)	17.0 / 12 / 7.0	21.0 / 16 / 11.0	25.0 / 20 / 15.0	29.0 / 24 / 19.0	33.0 / 28 / 23.0	40.0 / 32 / 24.0	44.0 / 36 / 28.0	48.0 / 40 / 32.0	72.0 / 64 / 56.0	
	12 hrs after start point (35% or more of initial dose)	13.4 / 8.4 / 3.4	16.2 / 11.2 / 6.2	19.0 / 14 / 9.0	21.8 / 16.8 / 11.8	24.6 / 19.6 / 14.6	30.4 / 22.4 / 14.4	33.2 / 25.2 / 17.2	36.0 / 28 / 20.0	52.8 / 44.8 / 36.8	
	24 hrs after start point (30% or more of initial dose)	12.2 / 7.2 / 3.0*	14.6 / 9.6 / 4.6	17.0 / 12 / 7.0	19.4 / 14.4 / 9.4	21.8 / 16.8 / 11.8	27.2 / 19.2 / 11.2	29.6 / 21.6 / 13.6	32.0 / 24 / 16.0	46.4 / 38.4 / 30.4	
	48 hrs after start point (25% or more of initial dose)	11.0 / 6 / 3.0*	13.0 / 8 / 3.0*	15.0 / 10 / 5.0	17.0 / 12 / 7.0	19.0 / 14 / 9.0	24.0 / 16 / 8.0	26.0 / 18 / 10.0	28.0 / 20 / 12.0	40.0 / 32 / 24.0	



A = Standard concentration

B = Minimum concentration to allow top up

C = Maximum top up concentration

* Methyl bromide concentrations less than 3 g/m³ are below the threshold for effectiveness.

Methyl bromide concentrations (g/m³) required to meet the AQIS standard

Version 2.6 November 2008

Danger – Methyl Bromide Fumigation in Progress

Dosage rate and duration: ……

Time and date the fumigation commenced: ……

Time and date the fumigation is complete: ……

Approved Fumigator name: ……

Container number(s): ……

Fumigation with Methyl Bromide

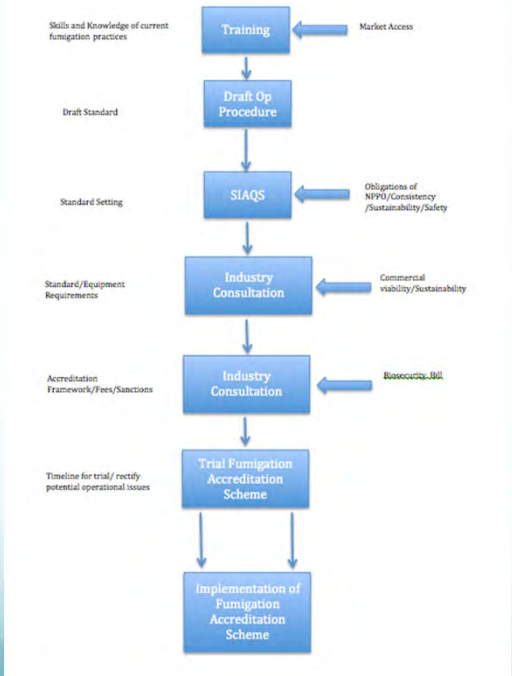
Operational Procedure for Accredited Businesses (Solomon Islands)

Operational Procedure - Fumigation with Methyl Bromide

- The purpose of today's session is:
  - To become familiar with the draft Operational Procedure - Fumigation with Methyl Bromide
  - Seek endorsement of the Operational Procedure
  - Seek endorsement of the framework for the accreditation, auditing and fees for service providers

Operational Procedure - Fumigation with Methyl Bromide

- The Operational Procedure does not prescribe OH&S aspects that may be applicable in your workplace
- You should consult your relevant Health and Safety Authority or equivalent if in doubt



Operational Procedure - Fumigation with Methyl Bromide

The Operational Procedure

Operational Procedure - Fumigation with Methyl Bromide

- Purpose
  - Describes the principles of operation, features and standards required
  - Responsibilities and actions of personnel

Operational Procedure - Fumigation with Methyl Bromide

- Scope
  - Covers all certification of methyl bromide fumigation treatments conducted by a Business approved by the Solomon Islands Agriculture Quarantine Service (SIAQS)
  - Does not abrogate or override the responsibility of the business to comply with local regulations or legislative requirements
  - **1.1 AQIS Methyl Bromide Standard (Risk Assessment)**

Operational Procedure - Fumigation with Methyl Bromide

- References
  - **AQIS Methyl Bromide Standard**
    - AQIS Methyl Bromide Fumigation Standard Version 1.7 November 2011

Operational Procedure - Fumigation with Methyl Bromide

- Definitions
  - **Approved Fumigator**
  - **AFAS**
  - **Approved Business**
  - **Calibration**
  - **Chamber**
  - **Chloropicrin***
  - **Concentration***
  - **Dosage***
  - **Fumigant***

Operational Procedure - Fumigation with Methyl Bromide

- Definitions
  - **Fumiscope®**
  - **Gas equilibrium***
  - **MiniRAE®**
  - **Minimum ambient temperature**
  - **Monitoring tube***
  - **Pa**
  - **Phytotoxic***
  - **Threshold Limit Value***

***AQIS Methyl Bromide Standard Definition**

Operational Procedure - Fumigation with Methyl Bromide

- **RESPONSIBILITY**
  - Business Principal (or delegate)
  - Approved Fumigator

Operational Procedure - Fumigation with Methyl Bromide

- Requirement
  - Fumigation with methyl bromide by an Approved Fumigator at a rate that conforms to the entry requirements of the destination country. Common Standard Dosage for Methyl Bromide Fumigation–
    - Timber - 48 g/m^3 at 21c for 24 hours at Normal Atmospheric Pressure (NAP)
    - Giant African Snail – 128 g/m^3 at 21c for 24 hours at NAP
    - Khapra Beetle – 80 g/m^3 for 48 hours with a minimum concentration of 24 g/m^3 after 24 hours at NAP
    - Stored Product Pests of Quarantine concern – 32 g/m^3 at 21c for 24 hours at NAP

Operational Procedure - Fumigation with Methyl Bromide

- Requirement
  - The Approved Fumigator shall ensure fumigations are not carried out if the ambient minimum temperature falls below 10° C.
  - The Approved Fumigator shall also ensure the fumigant dosage is compensated for ambient temperatures below 21° C.
  - The Approved Fumigator shall ensure for each 5°C (or part of 5°C) the temperature is expected to fall below 21 °C, 8g/m^3 is added to the dosage, unless otherwise specified by the importing country.

Operational Procedure - Fumigation with Methyl Bromide

- Operational Procedure divided up into logical parts
  - Prior to fumigation
  - Preparing and Sealing the Enclosure
  - Application of the Fumigant
  - Start Point Monitoring
  - End Point Monitoring
  - Completion of fumigation

Operational Procedure - Fumigation with Methyl Bromide

- Operational Procedure
  - Prior to fumigation
    - Fumigation Site Requirements
    - Fumigation Site Risk Assessment
    - Fumigation Equipment Maintenance
    - Pressure Testing Requirements
    - Sheet Fumigation
    - Calculation of Fumigation Enclosure Volume

Operational Procedure - Fumigation with Methyl Bromide

- Preparing and Sealing the Enclosure
  - Preparing the Enclosure
  - Packaging
  - Placement of Fumigant Supply Lines
  - Placement of Fumigant Monitoring Lines
  - Calculation of Fumigant Dosage

Operational Procedure - Fumigation with Methyl Bromide

- Application of Fumigant
  - Sealed System or Loss of Weight System
  - Calibration of Weighing Scales
  - Vaporiser/Volatiliser
  - Mixing of Fumigant
  - Testing for Leaks
  - Monitoring Fumigant Concentration

Operational Procedure - Fumigation with Methyl Bromide

- Start Point Monitoring
- End Point Monitoring

Operational Procedure - Fumigation with Methyl Bromide

- Equilibrium
  - The even distribution of gas within the chamber is called equilibrium
  - Equilibrium is achieved when all concentration readings are within 15% of the lowest reading

Operational Procedure - Fumigation with Methyl Bromide

- Start Point Monitoring
  - The fumigation exposure period does not start until
    - The readings at all at or above the standard concentration
      - AND
    - **You have equilibrium**
    - **Equilibrium is not necessary at any other time after the commencement of the fumigation exposure period**

Operational Procedure - Fumigation with Methyl Bromide

- Monitoring Frequency
  - Reading taken when you believe equilibrium has been achieved
  - Fumigations with less than 24 hrs exposure require start and end point monitoring
  - **AQIS Methyl Bromide Standard 8.2**

Operational Procedure - Fumigation with Methyl Bromide

- End Point Monitoring
  - The readings must all be at or above the Standard concentration

Operational Procedure - Fumigation with Methyl Bromide

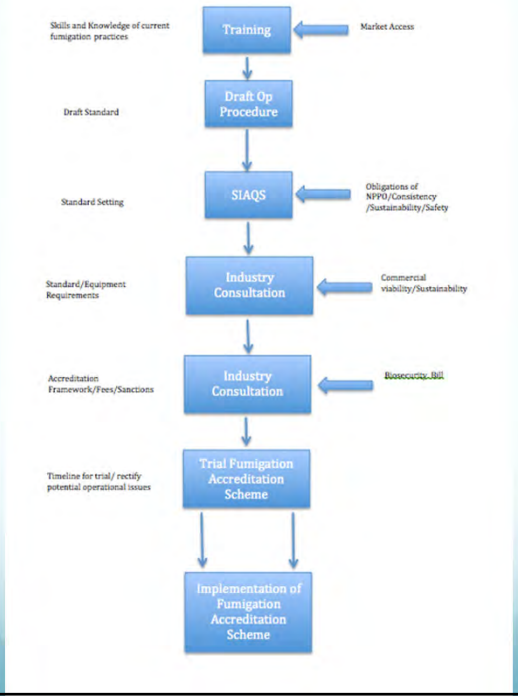
- Completion of Fumigation
  - Venting
  - Identification and Control of Treated and Untreated Commodities
  - Treatment Records

Operational Procedure - Fumigation with Methyl Bromide

- TLV
  - TLV refers to the maximum concentration a person can repeatedly exposed without causing harm (based on normal working week 8hr/day 40hrs week)
  - TLV in Australia is 5ppm
  - TV measuring equipment must be capable of reading accurately to 1ppm

Operational Procedure - Fumigation with Methyl Bromide

The Accreditation Framework



Operational Procedure - Fumigation with Methyl Bromide

- Accreditation Framework
  - Application for Accreditation
    - Must be an incorporated company/business
    - Must perform fumigations in accordance with Operational Procedure
    - Will upon request allow an inspector of SIAQS to enter Business or facility where a fumigation is being undertaken
    - Must take all steps to assist an inspector in the conduct of the audit

Operational Procedure - Fumigation with Methyl Bromide

- Equipment Requirements
  - MBr concentration measuring device (Riken, fumiscope)
  - MBr leak detection measuring device (MiniRAE or similar)
  - Vaporisor
  - Fan
  - Tarpaulin(s) or device for pressure testing containers
  - Dispensing unit
  - Sand snakes
  - Monitoring and dispensing lines

Operational Procedure - Fumigation with Methyl Bromide

- Fees
  - Dependent on Biosecurity Bill
    - Application (initial and annual renewal)
    - Audits
      - Initial
      - Compliance Audits (2 x year)
      - Follow up audits (to close out NCR)
      - Investigatory audits

Operational Procedure - Fumigation with Methyl Bromide

- Sanctions
  - Legislative
  - Administrative

- Administrative
  - Sanctions against business/not individual
  - Increased audit regime at fee for service for non compliant businesses
  - Ongoing non compliance may result in suspension of business
  - Outstanding fees may result in suspension of business

PARTICIPANTS NOTES

AUDITOR TRAINING COURSE

Table of Contents

INTRODUCTION

AIMS AND OBJECTIVES OF THE AUDITOR TRAINING COURSE

Course Aims

The aims of this course are to provide you with an understanding of auditing terminology, techniques and the skills necessary to perform an audit. Particular focus is auditing the Fumigation Accreditation Scheme.

Course Objectives

Upon completing this course you should be able to -

- demonstrate an understanding of the terms used in auditing;
- plan and undertake an audit
- report on audit findings; and
- understand how the Fumigation Accreditation Scheme works.

Course Duration

This course should take approximately 3.5 days to complete.

Module Structure

The Auditor Training Course consists of four modules that cover different subjects. As a participant you are required to develop the knowledge and skills described in each module so that you can successfully plan, undertake and report audit findings and understand how the Fumigation Accreditation Scheme works.

The information within these notes (Participants Notes) should be read in conjunction with other relevant learning and assessment materials.

MODULES

Below is a list of the modules that make up the course:

1. Background to Quality and Quality Management and the Fumigation Accreditation Scheme
2. Introduction to Auditing
3. Conducting an Audit
4. Accrediting an individual/business

WHAT IS NEEDED TO COMPLETE THE AUDITOR TRAINING COURSE

There is no prior knowledge of auditing or prerequisite skills required to undertake this course.

Before undertaking this course you should however:

1. Be willing to learn.
2. Be prepared to listen, ask questions and join in.

THE PARTICIPANTS NOTES

These notes have been written to assist you in developing the required knowledge and skills to successfully complete the Auditor Training Course.

These notes should be read in combination with the teaching tools and other additional information provided by your trainer.

These notes are for you to keep and cover the required information to achieve the learning outcomes of the course. You are welcome however to take additional notes.

ASSESSMENT

At the end of each Module you will be required to answer a number of short and multiple-choice questions. Also during lessons you will undertake exercises to demonstrate your knowledge and skills.

More specific information about the assessment activity can be found in the relevant assessment material.

RE-ASSESSMENT

Re-assessment may be requested at any time if you have completed an entire module and are deemed not yet competent.

OTHER CONSIDERATIONS

You may request or require special consideration in relation to the assessment.

You should contact the trainer as soon as possible if you have any problems with understanding the written materials.

It is better to raise your concerns with the trainer early in the course rather than leaving your concerns till the end of the course.

WHAT YOU SHOULD ACCOMPLISH

The Learning Outcomes for this training are structured across the four Modules of the training:

Learning Outcome	Assessment Criteria	Module & Lesson
After completing this module you should be able to:	You will know you have achieved this when you can:	
1. Understand the rationale in implementing the Fumigation Accreditation Scheme	Define the terms: • Quality • Quality Assurance • Quality Management • Audit • Nonconformance	Module 1 Lessons 2 & 3
2. Analyse the framework underpinning the Fumigation Accreditation Scheme	Understand the structure of the Fumigation Accreditation Scheme. Review the function of Operational Procedures an associated system records	Module 1 Lesson 3
3. Investigate the requirements of the Operational Procedure – Fumigation with Methyl Bromide to demonstrate how objective evidence determines the effectiveness of the accreditation	Research the requirements of the Operational Procedure. Identify how objective evidence is used to determine compliance with the Operational Procedure Identify the objective evidence to determine compliance with the requirements of the Operational Procedure – Fumigation with Methyl Bromide	Module 1 Lessons 2 & 3
4. Define when an audit is required	Identify the purpose of an audit Identify the audit types and when used. Understand the requirements for a business to maintain the accreditation	Module 1 Lessons 2 & 3

5. Understand the role and responsibilities of an auditor.	Identify the key auditor tools used for gathering evidence. Identify desirable and undesirable attributes of an auditor. Demonstrate effective listening behavior	Module 3 Lessons 3 & 4
6. Understand how to prepare, conduct and report an audit	Identify the elements of a desk audit Understand the interaction with a business prior to an audit. Prepare an audit checklist. Demonstrate how to conduct the phases of an audit and write up an audit report Write up a non-conformance and understand mechanisms for close out.	Module 2 Lesson 1 Module 4 Lesson 2 & 3

7. Determine the administrative requirements for an accreditation.	Understand the administrative requirements for an accreditation.	Module 4 Lesson 1

COURSE SUMMARY

Time	Activity	Subject
	Welcome	Introduce Trainer(s) and House Keeping
	Course Introduction	About the Auditor Training Course
	Exercise One	Group Exercise
Module One - Background to Quality and Quality Management and the Fumigation Accreditation Scheme		
	Lesson One	Introduction to Quality Assurance
	Lesson Two	Introduction to the Fumigation Accreditation Scheme
	Lesson Three	Structure of the Fumigation Accreditation Scheme
Module Two – Introduction to Auditing		
	Lesson One	Purpose and Type of Audits
	Lesson Two	Understanding the Operational Procedure – Fumigation with Methyl Bromide
	Exercise One	Operational Procedures
	Lesson Three	Auditing Techniques, Methods and Tips
	Exercise Two	Positive Listening
	Lesson Four	Auditor Skills
Module Three – Conducting an Audit		
	Lesson One	The On-Site Audit
	Exercise One	Preparing Audit Checklists
	Lesson Two	Non conformances
	Exercise Two	How to Write Nonconformance Reports
	Lesson Three	Mock Audit
	Exercise Three	Mock Audit
	Lesson Four	Reporting the Audit
	Exercise Four	How to Report the Audit
Module Four – Accrediting Individuals and Businesses		
	Lesson One	Granting, Cancelling and Suspending Arrangements
	Exercise One	When to Suspend, Cancel & Amend

*** As this course is a pilot, times have not been allocated to different lessons and exercises**

EXERCISE ONE – GROUP EXERCISE

Instructions

Auditing involves interaction via questioning, listening and speaking to individuals and small groups. This exercise will assist you in improving your communication skills and allows the group to get to know you.

You are to introduce the person next to you to the group in a presentation lasting no more than 2 minutes. To prepare your presentation each pair has 5 minutes (total) to ask and listen.

You should each cover at least the following:

- Name.
- Employer and position or role.
- Previous experience/knowledge of auditing.
- Expectations of the course.
- Other useful or interesting information (hobbies etc).

TIME ALLOWED: 15 minutes

MATERIALS REQUIRED: Pen and paper

MODULE ONE

Background to Quality and Quality Management and the Fumigation Accreditation Scheme

INTRODUCTION

AIMS AND OBJECTIVES OF THIS MODULE

Module Aims

This is the first module in the Auditor Training Course and is titled ***Background to Quality and Quality Management and the Fumigation Accreditation Scheme***. The aim of this module is to provide you with an introduction to quality assurance/quality management principles and to describe the structure and supporting elements of the Fumigation Accreditation Scheme.

Module Duration

This module should take approximately 3 hours to complete.

How is this Module structured

This module has three lessons;

Lesson One – Introduction to Quality Assurance

Lesson Two – Introduction to the Fumigation Accreditation Scheme

Lesson Three – Structure of the Fumigation Accreditation Scheme

SUBJECTS COVERED IN THIS MODULE

The subjects covered in this module include:

Lesson One

- Terms and Definitions
- Quality Assurance
- Hazard Analysis and Critical Control Point (HACCP)

Lesson Two

1. Background to the Fumigation Accreditation Scheme
2. Differences between the Fumigation Accreditation Scheme and other quality management systems
3. The Fumigation Accreditation Scheme versus end-point monitoring
4. The benefits of the Fumigation Accreditation Scheme to the SIAQS and the accredited business

Lesson Three

1. Structure of the Fumigation Accreditation Scheme

2. Supporting elements of the Fumigation Accreditation Scheme

LESSON ONE
INTRODUCTION TO QUALITY ASSURANCE

TERMS AND DEFINITIONS

The following is a list of commonly used terms important to this lesson and their definitions.

Term	Definition
quality	*Degree to which a set of inherent characteristics fulfils requirements Or Suitability for purpose.
Quality Assurance (QA)	*Quality assurance is a set of activities intended to establish confidence that quality requirements will be met. QA is one part of quality management. Or Is this right or fit for purpose?- (controlling the processes to make a quality product)
Quality Management (QM)	*A quality management system is a set of interrelated or interacting elements that organizations use to direct and control how quality policies are implemented and quality objectives are achieved. Or Are we doing it right and how can we do it better?
nonconformance	*means the failure to comply with requirements. A requirement is a need, expectation, or obligation.

*ISO 9000

INTRODUCTION TO QUALITY CONTROL/ QUALITY ASSURANCE

The formal concepts of quality control and quality assurance were developed in the 19th and 20th centuries during the industrial revolution. The general concepts have long existed but development of the principles and how they are implemented was driven by the increasingly complex production processes. Up until the 19th century, one craftsman or worker was responsible for the item they were manufacturing and therefore this person would totally control the quality of the work.

With the arrival of the industrial revolution, workers in a factory would be supervised and this person assumed responsibility for the quality of the work.

During World War I, items being produced for the war effort became much more complex and inspectors (beside supervisors) were employed full time to inspect each item being produced/manufactured.

During World War II the mass production requirement led to the inception of a quality control approach involving statistical sampling of end products.

After World War II the American manufacturing industry were being sold the benefits of a system called Quality Assurance, which changed the production process so that they did not rely on an end point inspection and ultimately produce defective goods. The Americans were not interested however so the concept went to Japan as part of the American aid package after WWII and helped Japan and later Korea rebuild their manufacturing industries using the principles of Quality Assurance.

Since this time relying on detecting and correcting defective products at the end of production is no longer an acceptable practice with prevention now being the goal.

QUALITY SYSTEMS

There are numerous quality system (standards) that use quality assurance principles. These standards all have a number of things in common including all being auditable at either a second or third party level and having elements or clauses that stipulate what the 'supplier' shall do to meet that requirement however most do not describe the 'how' this is done. **They all require some level of documented procedures that describe the system and record keeping.**

Examples of standards include:

- AS/NZS ISO 9000 series of Quality System Models;
- International Standard for Phytosanitary Measures (ISPM) 12: Phytosanitary Certificates;
- Codex General Standard for Quick Frozen Fish Fillets CODEX STAN 190 – 1995;
- DAFF (formerly the Australian Quarantine and Inspection Service, AQIS) quality systems including Compliance Agreements (CA) and Approved Quarantine Directives
- Interstate Certification Assurance quality system for the certification of produce for interstate trade in Australia

Certification and Accreditation

As described, these 'standards' are auditable. Audits can be undertaken by the business implementing the system (internal or first party audit) customer (second party audit) or by a person that is independent of the customer and the business that has implemented the system (third party audit). There will be more discussion on second and third party audits later.

Second and third part audits are used to verify that the 'supplier' has developed, documented and implemented their quality system in accordance with their chosen standard.

In Australia and New Zealand there are a number of independent third party certification bodies and some also operate across the Pacific region. These bodies (in most cases) are 'accredited' by the Joint Accreditation System for Australia and New Zealand (JAS-ANZ). The JAS-ANZ role is to determine the ability of the certification bodies and their capacity to meet international auditing standards.

HACCP (A BRIEF INTRODUCTION)

Brief History of HACCP

The space program in North America in the 1960's quickly realised that astronauts could not afford to get food poisoning in space. The space agency NASA in conjunction with the US armed services and private companies worked together to develop a system to ensure the food was safe for astronauts.

The joint project purpose was to develop systems to control raw materials, processes, the processing environment, personnel, the storage environment and distribution channels in order to prevent food safety issues.

The revolutionary Hazard Analysis and Critical Control Point (HACCP) technique evolved from this project. HACCP incorporated a systematic approach to food safety, relying upon the identification of hazards and amending the production processes to prevent those hazards rather than rely on end-point inspection.

Remember doctors couldn't make house visits in space and weightlessness presents a myriad of problems when it comes to bodily fluids.

About HACCP

HACCP is a risk management tool used to identify and prevent, eliminate and/or control hazards within a production process. HACCP is made up of seven principles that are applied in 12 steps.

The difference between a quality assurance system and the HACCP technique is that HACCP is specifically designed to look at the hazards (mostly food safety) in a production system and ways to control those hazards. The quality assurance system uses this information and builds on it not only to include the process of production but to ensure the customer gets what he/she wants on time every time.

It is common to see quality assurance and HACCP used together in integrated food processing facilities. It is also not uncommon for modern businesses to have 4 or 5 quality assurance systems to meet different customer requirements.

HACCP and the Procedures Manual - Fumigation with Methyl Bromide

The Procedures Manual - Fumigation with Methyl Bromide does not directly use HACCP because the hazards and their methods of control are normally already known. Also the Procedures Manual - Fumigation with Methyl Bromide is not a food safety system; it is used to control plant pests.

As auditors you may come across businesses that have quality assurance systems such as those mentioned above that contain HACCP plans. These plans may contain reference to quarantine hazards and quarantine procedures. In such cases your duty is not to review the HACCP plan but to simply ensure that the business is complying with the prescribed requirements specified in the relevant fumigation procedure (Procedures Manual - Fumigation with Methyl Bromide).

LESSON TWO
INTRODUCTION TO THE FUMIGATION ACCREDITATION SCHEME

TERMS AND DEFINITIONS

The following is a list of commonly used terms important for this lesson and their definitions

Term	Definition
Accreditation	to accredit a supplier (business) to perform a specific function (fumigate) to an agreed requirement.
Accredited business	a person or body approved to conduct fumigations under the Fumigation Accreditation Scheme by the Accrediting Authority, the Solomon Islands Agriculture Quarantine Service.
Accrediting authority	for the purposes of the Fumigation Accreditation Scheme, the Solomon Islands Agriculture Quarantine Service.
Fumigation Accreditation Scheme	the framework, responsibilities, processes and resources needed for implementing the requirements of the accreditation for fumigation with methyl bromide.

WHAT IS THE FUMIGATION ACCREDITATION SCHEME?

The Fumigation Accreditation Scheme was developed to provide a cost-effective alternative to the supervision and certification of fumigation treatments by government inspectors.

The Fumigation Accreditation Scheme utilises the principles of quality management whereby an accredited business assumes responsibility for the treatment of product that may have previously been undertaken or supervised by SIAQS inspectors. The accrediting authority (SIAQS) ensures that the treatment processes of the accredited business are in place and working effectively through a program of regular audits.

The Fumigation Accreditation Scheme uses a different approach to most quality management system standards used and can be described as a 'Prescriptive Quality Management System'. Instead of a business developing and documenting its own quality management system shaped around its own business and the requirements it needs to meet, the Fumigation Accreditation Scheme is developed and documented by the SIAQS in collaboration with stakeholder groups.

The Fumigation Accreditation Scheme allows a business or provider to become accredited to fumigate product to meet a specific quarantine treatment condition for the country to where the

product is to be exported. The business is not required to develop and document a quality manual or operating procedures, which makes the Fumigation Accreditation Scheme simpler to implement.

The Fumigation Accreditation Scheme identifies and implements best practice in methyl bromide fumigation treatment of product and provides a high level of assurance that the treated product meets the requirements of the importing country's quarantine authority. Accredited businesses are audited against the same Fumigation Accreditation Scheme requirements.

DIFFERENCES BETWEEN THE FUMIGATION ACCREDITATION SCHEME AND SUPERVISION OF TREATMENTS

There are two main differences between the Fumigation Accreditation Scheme and traditional supervision of methyl bromide treatments. They are:

1. Supervision of a treatment relies on an SIAQS inspector to check during and/or at the end of the fumigation process. The Fumigation Accreditation Scheme is based on quality management principles that ensure checks are built into the systems rather than relying on a final end result.

2. The accredited business and its nominated staff are responsible for conducting the fumigation appropriately and assuring the product complies with the relevant conditions, not another party such as a SIAQS inspector.

ACCREDITATION SCHEME BENEFITS

The Fumigation Accreditation Scheme potentially can provide many benefits over SIAQS supervised treatments and quarantine certification.

The benefits of adopting the Fumigation Accreditation Scheme for individual businesses will vary between businesses and is likely to relative to the value and amount of product it fumigates. The benefits however will normally include:

- flexibility in planning as businesses are no longer dependent on the presence of a SIAQS inspector to supervise the methyl bromide fumigation treatment;
- improved effectiveness with staff roles and responsibilities clearly defined and documented;
- improved knowledge by staff and management of quality issues with the introduction of quality management to the business;
- improved staff involement in ensuring effective product treatment through training and documented procedures; and
- potentially reduced inspection and certification costs.

Benefits for industry include:

- SIAQS resources needed for the supervision of fumigation treatments are able to be reassigned to other biosecurity activities such as surveillance, monitoring and eradication of exotic pests and management of pest outbreaks;

- likelihood reduced disruptions to market access through improved quarantine systems and reduced system failures; and

- enhanced awareness of quality assurance and quality management leading to increases in industry efficiency.

SIAQS also benefits from utilising the Fumigation Accreditation System. **Benefits to SIAQS include:**

- better use of resources as SIAQS inspectors are no longer required to supervise the methyl bromide fumigation treatments;

- confidence that Solomon Island's product meets overseas quarantine requirements as the Fumigation Accreditation System has well defined requirements, improved training and defined roles and responsibilities.

- reduced complexity and variability when compared to industry derived quality management systems because all accredited businesses operate under the same system requirements, i.e. an auditor does not have to assess a different quality system for each business.

LESSON THREE
STRUCTURE OF THE FUMIGATION ACCREDITATION SCHEME

HOW THE FUMIGATION ACCREDITATION SCHEME IS STRUCTURED

ADMINISTRATIVE PROCEDURES

A basis of any quality management system is the control of documents. Document control is an essential preventive measure ensuring that only approved, current documentation is used for the Fumigation Accreditation Scheme. Unintentional use of out-of-date documents can have significant negative consequences on quality the effectiveness of the scheme.

The purpose of the Administrative Procedures is to provide detail on how the Fumigation Accreditation Scheme is to be managed and administered by the SIAQS.

Administrative Procedures can cover such things as:

- auditing accredited businesses;
- audit reporting;
- dealing with nonconformances; and
- incident reporting and investigation.

OPERATIONAL PROCEDURES

The purpose of the Operational Procedure – Fumigation with Methyl Bromide is to give effect to the procedure at the accredited business level. The Operational Procedure describes the requirements for accreditation of a business for methyl bromide quarantine treatments.

The Operational Procedure details –

- the methyl bromide quarantine treatment requirement to be met;
- the scope of the procedure;
- the responsibilities, duties and roles of staff;
- the principles of operation;
- process controls that must be implemented; and
- the records and documentation that must be maintained by the accredited business;
-

WORK INSTRUCTIONS

Work Instructions support the operational procedure and provide specific instructions on how to carry out an activity relevant to the operational procedure.

Examples of work instructions to provide specific instruction may include:

- guidelines for the completion of forms, certificates and other documentation relevant to the Fumigation Accreditation Scheme, or
- a work instruction on how to use or calibrating or test equipment such as a gas monitoring device etc.

FORMS AND RECORDS

Records must be maintained by both the accredited person/business and the SIAQS to verify that required activities have been undertaken in accordance with specified requirements in the operational procedure.

MODULE TWO

INTRODUCTION TO AUDITING

INTRODUCTION

AIMS AND OBJECTIVES OF THIS MODULE

Module Aims

This is the second module in the Auditor Training Course and is titled ***Introduction to Auditing.*** The aim of this module is to give you an introduction to the objectives and purpose of auditing.

Module Duration

This module should take approximately 3 hours to complete.

Module Structure

This module has 4 lessons.

Lesson One – Purpose and Type of Audits

Lesson Two – Understanding the Operational Procedure – Fumigation with Methyl Bromide

Lesson Three – Auditing Techniques, Methods and Tips

Lesson Four – Auditor Skills

SUBJECTS COVERED IN THIS MODULE

The subjects covered in this module include:

Lesson One

1. Terms and Definitions
2. Purpose of Auditing
3. Types of Quality System Audits
4. Types of Audits

Lesson Two

1. Operational Procedure – Fumigation with Methyl Bromide
2. Elements of the Operational Procedure

Lesson Three

5. Collecting Data
6. Auditing Techniques

7. Auditing Methods

8. Listening Skills

Lesson Four

1. Roles and Responsibilities of Auditors

2. Auditor Attributes

3. Human Factors in Auditing

4. Knowledge of the Auditor

LESSON ONE
PURPOSE AND TYPE OF AUDITS

TERMS AND DEFINITIONS

The following is a list of commonly used terms important for this lesson and their definitions.

Term	Definition
announced audit	an audit where the business/auditee has been advised in advance of the audit.
audit	a verification activity aimed at evaluating the conformance of an accreditation.
Auditor	a person qualified to perform audits.
Desk Auditor	an auditor allocated to undertake a desk audit.
On-site Auditor	an auditor appointed to undertake an on-site audit.
Unannounced audit	an audit where the business/auditee has not been advised in advance of the audit.

THE PURPOSE OF AUDITING

The purpose of audits is to:

- confirm Fumigation Accreditation Scheme (Business Application Forms) applications are completed correctly and contain the required information;
- confirm the information contained in the application is correct;
- confirm procedures and equipment are in place and operating, in accordance with the operational procedure;
- confirm staff are adequately trained and aware of their responsibilities;
- investigate nonconformances or allegations that requirements under the procedure are not being met;
- check changes to the business' personnel and equipment; and
- confirm nonconformances have been rectified or carry-over.

In summary the aim of the audit is to establish whether what is actually happening at audit meets the requirements of the Operational Procedure.

Benefits of the Audit

Auditing of the Fumigation Accreditation Scheme encourages corrective and preventative actions and assists the accredited business to perform a consistent and repeatable fumigation to an agreed standard.

It is incorrect to assume the aim of auditing is to find faults within a system and to correct them after the event. The role of an audit is to determine whether actual practices conform to documented procedures. **The role of an auditor is not one of accusing, finding fault and allocating blame, although as part of the audit process nonconformances may be detected.**

The aim of a business maintaining an accreditation is to ensure that the methyl bromide fumigation treatment complies with predetermined requirements. In this case, meeting the treatment requirements of the importing country. The business aims to manage the quality of its products and to essentially to self-regulate its operation. The audit must ensure that the system is achieving its aim, as it is too late if an audit discovers that the system is deficient in a critical area.

QUALITY SYSTEM AUDITS

Auditing can be classified into three levels;

- First party or internal;
- Second party or customer; and
- Third party or external.

A first party audit is when a business audits itself (SIAQS internal audit), a second party audit is when the customer (the organisation specifying the requirements [SIAQS] audits a supplier [accredited business]), and a third party audit is when the organisation (SIAQS) is audited independently by an outside person.

Audits under the Fumigation Accreditation Scheme are second party audits. That is, audits are conducted by the SIAQS of the accredited business.

AUDIT TYPES

The type and scope of the audit you are conducting will depend on whether the audit is an in office desk audit or an on-site audit. The scope of the audit will also depend on whether the audit is investigatory, compliance or follow-up.

Desk Audit

A desk audit is the first step in accrediting a business and usually involves an in-office assessment of the business seeking accreditation to –

- confirm each application is complete and correct and any necessary information has been provided prior to passing the application for the desk audit; and
- provide advice to applicants on further information required to correctly complete an application.

On-Site Audit

On-site audits are conducted to confirm that the system is in place and working, or able to operate, in accordance with the requirements of the Operational Procedure – Fumigation with Methyl Bromide.

There are four types of on-site audit:

- initial (or accreditation);
- compliance;
- follow-up; and
- investigatory.

Audits may be either announced, where the auditee is notified in advance of the audit, or they may be unannounced where the auditee is not given prior notice of the audit.

Initial Audits

Initial audits are carried out prior to accreditation of a business. They are undertaken to confirm that the business seeking accreditation has implemented the required processes and carried out the necessary staff training to meet the requirements of the Operational Procedure.

Initial audits are always announced audits.

Compliance Audits

Compliance audits are conducted following initial accreditation of a business to confirm that the accreditation continues to operate in accordance with the Operational Procedure.

Compliance audits may be scheduled (at regular defined intervals according to the audit schedule specified) or unscheduled. Unscheduled (or random) audits can be carried out on selected businesses each year and may be in response to specific compliance issues that may need to be investigated.

Random audits may be full compliance audit, or may be of limited scope to check fumigant concentrations,

system records or system documentation. In other words, random unannounced audits do not need to entail a full audit of the system.

Compliance audits may be announced or unannounced audits.

Follow-Up Audits

Follow-up audits are announced audits conducted following a nonconformance detected during a previous audit and are undertaken to confirm that appropriate corrective action has been undertaken to correct the nonconformance and to prevent recurrence. Their scope is always limited to ensuring that any outstanding nonconformances have been addressed.

Follow-up audits are always announced audits.

Investigatory Audits

Investigatory audits are conducted to investigate reported or suspected non-conformance by an accredited business. Investigatory audits are carried out to confirm whether a nonconformance exists and, where appropriate, identify the cause.

Should a charging policy exist for audits, investigatory audits are usually at no charge unless a nonconformance is detected.

Investigatory audits may be announced or unannounced audits.

LESSON TWO

UNDERSTANDING THE OPERATIONAL PROCEDURE – FUMIGATION WITH METHYL BROMIDE

LETS GET TO KNOW THE OPERATIONAL PROCEDURE

The operational procedures specifies the requirements that a business must meet to gain accreditation to certify product for a specified quarantine requirement (fumigation treatment).

To effectively audit an accreditation/business, an auditor must have a sound understanding of the accreditation process and relevant Operational Procedure - Fumigation with Methyl Bromide.

It is critical that auditors set aside time and prepare for audits and have access to the latest copy of the operational procedure, work instructions and forms when preparing for and during an audit.

In this lesson we are going to look closely at the Operational Procedure – Fumigation with Methyl Bromide.

THE ELEMENTS OF AN OPERATIONAL PROCEDURE

This Operational Procedures (and future manuals) should be designed in the same manner for consistency and must covers the following minimum headings:

Purpose

Outlines the object or intention of the Operational Procedure.

Scope

Outlines the area of application of the Operational Procedure.

The scope defines the treatment covered by the Operational Procedure.

References

Details other documents that have relevance on the activities covered by the Operational Procedure e.g. AQIS Methyl Bromide Standard

Definitions

Clarifies a word, group of words or acronym which has a specific application within the Operational Procedure, or which may not be commonly understood by the reader.

Responsibility

Details the responsibilities assigned to each of the positions identified in the Operational Procedure.

Requirement

Specifies the quarantine requirement that certified product is required to meet under the Operational

Procedure.

Procedures

Describes in detail the processes that must be implemented by a business for the Authority (SIAQS) to accredit that business under the Fumigation Accreditation Scheme to certify that product meets the specified quarantine requirement of the Operational Procedure.

The Procedures section outlines the system and system controls that apply under the Operational Procedure.

Attachments

Lists any documents attached to the Operational Procedure, eg example forms, Ready Reckoner.

EXERCISE ONE – OPERATIONAL PROCEDURE

Instructions

As an auditor you should know the Operational Procedure and be able to identify and explain the requirements in the operational procedures.

Your brief is to familiarise yourself with the elements of the Operational Procedure – Fumigation with Methyl Bromide and identify its requirements. To do this you must do the following:

1. Individually review the Operational Procedure to gain an understanding of the requirements that must be met. (mark the "musts" and "shalls" in the procedure)
2. In your group* identify what objective evidence you'd wish to see for the sections of the Operational Procedure you have been given. What indicates to you that this procedure is being followed by the business?
3. In your group* refine your answers and choose a spokesperson to present your findings.

TIME ALLOWED: 30 – 45 minutes

MATERIALS REQUIRED:

Writing Materials

The Operational Procedure – Fumigation with Methyl Bromide.

*Group activities will depend on class size.

LESSON THREE
COLLECTING DATA, AUDITING TECHNIQUES & TOOLS

COLLECTING AND ANALYSING DATA

Data is defined as:

Facts and statistics collected together for reference and analysis

There are two types of data:

- subjective - based on experience, intuition, opinion and sometimes called gut feeling; and
- objective - based on verifiable events including observation.

At audit, the auditor seeks objective evidence through audit (interviews) with staff, observation of activities or processes and analysis of equipment, records and documents to confirm the conformance or nonconformance of the business to the requirements of the operational procedure.

It is important to remember that the purpose of the audit is to determine 1) that the system is in place and ready to operate or 2) operating in a manner that the requirements of the relevant Operational Procedure will be complied with.

DIFFERENT AUDITING TECHNIQUES/METHODS

Utilising different auditing techniques or methods is essential to ensuring a successful audit. Understanding the auditing techniques available to the auditor and when to use them can significantly improve the planning, conduct and outcome of an audit.

How to Sample Records

When examining system records, it is not necessary for the auditor to review every record completed by the business. Auditors should select a representative sample of records and examine this sample to verify compliance with requirements.

A simplified sampling methodology for determining the number of records to be sampled based on the number of records completed since the last audit is -

1. 1 to 10 records - each record to be audited;
2. 10 to 30 records - at least every third record and not less than 15 records to be audited;
3. 31 records or more - at least every fifth record and not less than 20 records to be audited.

Records are selected at random.

Document Tracking

This technique involves tracing documents/records from their creation to their completion, checking the compliance of a number of functions along the way.

Document tracking is a very comprehensive technique however can be time consuming.

Trace back

This technique involves document trace back through the system. For example, it would be possible to take a completed Phytosanitary Certificate returned from overseas and trace it back through the system, examining associated records of treatment, equipment, calibration to determine the effectiveness and operation of the system.

AUDITOR APPROACHES

Three important approaches are available to an auditor to gather information (data) on which to base decisions and report the findings of an audit:

- observing;
- questioning; and
- listening.

Observing

It is extremely important that auditors realize non-verbal communication forms a significant component of an audit. Auditors need to be observant of the surroundings in which they are auditing. In addition, auditors must be able to interpret body language of the auditee as important clues may be obtained from observing gestures and mannerisms.

The auditor can learn about the operating procedures in place and the related responsibilities of staff by observing the system processes as they are performed. An example would be to ask the fumigator to demonstrate how they release the methyl bromide into the enclosure.

Questioning

It is necessary for an auditor to understand the distinction between an open and closed question. An open question generally incites a response of some detail and does not allow the person to simply answer yes or no.

A closed question usually asks for a simple yes or no answer. An example of an open question is, "How do you feel about this course?" while an example of a closed question is "Do you like this course?".

Because open questions encourage people to share more information, they are generally more helpful than closed questions in an audit situation.

A key factor in gathering data using an interview or questioning technique is to gain the co-operation of the interviewee.

Question Types

Listed below are the types of questions you may use and examples of those questions:

- **Open ended**

Introduce the subject area. The open-end question should be broadly framed. It should call for an explanatory answer and should not permit a "yes-no" type answer.

eg. "Could you tell me about how you dispense the methyl bromide....."

rather than "Do you use a volumetric cylinder to dispense the methyl bromide ..... ?"

- **Constructive**

These questions are designed to get the auditee to enlarge upon their answers. The key words in a development question would be 'How', 'What, 'When'. Their most important characteristic is, they do not call for a "yes-no" type answer.

- **Evaluative**

This question allows you to check your understanding of facts and ideas which the auditee has communicated to you. Explain your understanding of what the auditee has told you and confirm with a question like:

"Would that be an correct picture?"

If confirmed by the auditee, you could ask something like:

"Is there anything I missed?"

- **Clarifying**

This question follows the evaluative question in seeking more information. It is based on "Why". Be careful to refine the question 'Why' with a polite delivery. Affinity with the auditee can be lost immediately with an approach that appears to be abrupt or dominant.

eg. "I have one dilemma. Do you know why ..... ?"

- **Confirmation**

This type of question is used to finish questions in the area, before moving to the open ended question in the next cycle.

eg “Thank you.....You have made it a lot clearer. Would I be correct in saying we've now looked at every aspect of.....?”'

The purpose here is to create the right kind of perspective - to reassure the auditee that the end-result is that he will ultimately benefit. It has been said of this type of interview that 75% of the skill of the interview is in the planning and preparation.

LISTENING SKILLS

People tend to spend more time listening than they spend on any other communication activity, yet people never learn to listen well. One reason is that they develop poor listening habits in their early years that continue with them throughout life.

Poor Listening Behaviors

The following list contains some of the most common poor listening behaviors.

Not attentive	Listeners allow themselves to be distracted or to think of something else. Also, boredom and not wanting to listen often contributes to not being attentive.
Pretend listening	People who are thinking about something else deliberately attempt to look as though they were listening. Such pretense may leave the speaker with the impression that the listener has heard some important information or instructions offered by the speaker.
Listening but not hearing	Sometimes a person listens only to facts or details or to the way they were presented and misses the real meaning of what was said.
Rehearsing	Some people listen until they want to say something; then they stop listening, start rehearsing what they will say, and wait for an opportunity to respond or interject.
Interrupting	The listener does not wait until the complete meaning can be determined, but interrupts and makes the speaker stops in mid-sentence.

Hearing what they expect	People frequently think they heard auditees say what they expected them to say. Alternatively, they refuse to hear what they do not want to hear.
Feeling Defensive	The listeners assume that they know the auditor's intention or why something was said, or for various other reasons, they expect to be criticized.
Point of disagreement	Some listeners seem to wait for the chance to criticize someone. They listen intently for points on which they can disagree.

Improve Your Listening Behaviors

People can improve their listening by identifying their own poor listening behavior and make an effort to change them. The list of poor listening habits described will help you to identify some of your own listening habits.

If you pay attention to the situations that invite bad listening behavior you can consciously attempt to change bad habits. An example, if you realise you are pretend listening stop the speaker and ask him to repeat.

The more you become conscious of poor listening behavior the more likely you are to change poor habits. As well as ridding yourself of bad listening habits, people can acquire positive listening habits. Listed below are descriptions of effective listening behaviors.

Being attentive	If people want to be good listeners, they must force themselves to pay attention to the speaker. When speakers are dull conversationalists, a listener must sometimes use effort to keep from being distracted. It is important not only to focus on the speaker, but to use non-verbal cues (such as eye contact, head nods, and smiles) to let the speaker know he is being heard.
Listening for the message	This includes looking for meaning and consistency in both the verbal and non-verbal communication and listening for ideas, feelings and intentions as well as facts. It also includes hearing things that are unpleasant or not welcome.
Evaluating correctly	Listening to what someone says without drawing a premature conclusion is a valuable aid to listening. By questioning the speaker rather than giving advice or judging, a listener can often discover what the speaker has in mind - which many times is quite different from what the listener had assumed.

Repeating what was heard	If the listener paraphrases the words of the speaker and asks if that is what was meant many misunderstandings and misinterpretations can be avoided.

EXERCISE TWO – LISTENING SKILLS

Instructions

As an auditor you will require good questioning and listening skills. This exercise is used to demonstrate these skills.

In this exercise you will form pairs and one person will take instructions and the other will be the instructor.

The person taking the instructions will be blind folded and given a small item that they have to build by asking questions of the instructor. The person taking the instructions cannot ask what it is or a full description of how to build it. The person taking the instructions can ask questions like:

Where should I begin?

What shape should I connect next?

Is this piece correct?

The instructor should only give sufficient information to answer each question correctly. The instructor should not volunteer information or provide any more information than is needed to answer each question.

Once the item has been completed the person taking the instructions can remove the blind fold and discover what has been built. If time permits roles can be reversed using a different item.

TIME ALLOWED: 15 minutes

MATERIALS REQUIRED:

- Blind Fold
- Small item

LESSON FOUR
AUDITOR SKILLS

ROLES AND RESPONSIBILITIES OF AUDITORS

Auditing, like any learned skill, takes practice and practice. Gaining confidence in audit results will depend on the auditor's proficiency, competence, expertise, judgment and conduct.

Auditors are responsible for:

- Auditing to requirements;
- communicating and clarifying audit requirements;
- preparing and carrying out assigned audit responsibilities effectively and efficiently;
- compiling and reporting audit results;
- treating privileged information with discretion.

To conduct an audit an auditor should have at least the following -

- thorough knowledge and understanding of the Operational Procedure – Fumigation with methyl Bromide;
- sound people skills and skills in examining, questioning, evaluating and reporting;
- an ability to reach decisions (separate fact from opinion, compare evidence with requirements); and
- practical experience to recognise deficiencies in the operating system and recognise incomplete or misleading information.

Auditors must be free from any bias, independent of the business being audited, and free of influences that could affect objectivity. Auditors that cannot meet these criteria with certain businesses should not audit.

All persons involved with an audit should respect and support the independence of the auditor.

SOME AUDITOR ATTRIBUTES

Listed below are examples of desirable and undesirable attributes for an auditor:

Desirable Attributes

Sensitive	Tolerant
Attentive	Inquiring mind
Communicator	Industrious
Resilient	Unbiased

Professional	Articulate
Analytical	Reliable
Listens	Non judgmental

Undesirable Attributes

Unprofessional	Narrow-minded
Impatient	Disruptive
Argumentative	Not observant
Naive	Lazy
Pedantic	Not prepared
Accepting	Wants to be loved by all

HUMAN NATURE IN AUDITING

Potential problems in the interaction between the auditor and the auditee can be divided into three broad areas, namely:

- personality of the auditor;
- personality of the auditee;
- the knowledge of the auditor.

Auditor Types

There are different types of people and character types and, as auditors are only people, there are also many different types of auditors. The following are some examples of auditor types that should and should not be aspired to:

Failing the Business

The purpose of the audit is to find a nonconformance at all costs. There is a common misconception that an auditor has not performed a satisfactory audit unless they have found a nonconformance and that the more nonconformances found, the better. **This is not the case**. If the business complies, complete the audit and acknowledge the successful audit result.

Should a nonconformance be detected, document the nonconformance and explain the reasons to the auditee.

A simplification would be to compare the roles of the auditor and a lawyer. Both:

- must maintain the confidentiality of the client; and
- have integrity so as not to embarrass or antagonize the client.

The Dictator

There are some people who unconsciously see the audit process as their right to give commands on changing procedures and systems, which do not form part of their day-to-day responsibilities. Being an auditor does not give one the right to be the CEO. If one is giving commands, one cannot listen effectively.

Disregarding the auditee's response or the contents of the procedure will lead to -

- antagonism;
- non co-operation in the future; or
- a possible total disregard for the procedures by the auditee in the future.

Re-training of the 'over zealous' auditor may be needed to rectify the problem.

A Friend

When the auditor is friends with everyone and sees auditing as a threat to that friendship, difficult questions are not asked, the auditor is easily distracted and the audit is ineffective.

It is possible to have an objective audit of a friend, so long as you audit the system. More often than not, the difficulty of auditing a friend only occurs in the first few audits, until both parties are aware of the mechanism and goal that is trying to be achieved.

The Suspicious Auditor

The belief that every auditee is out to hide something and deceive the auditor will lead to a level of suspicion and mistrust between the two parties. An auditor cannot listen effectively to an auditee's response if he disbelieves everything the auditee is saying.

The Friendly Introduction

A good auditor has the ability to put the auditee at ease with opening comments and subsequent questions. The auditor should at all times encourage openness and friendliness in order to progress the audit.

The danger is that unless the auditor has been well trained, opening comments said in jest as an icebreaker may have unpleasant results. The auditor should be careful that opening comments are not demeaning, slanderous or discriminating. It is very difficult to recover the situation after saying something silly and following with the gesture 'I'm an auditor - take me seriously'.

The art comes with practice, observation of other auditors, and observation of the body language of the auditee. At the end of an audit assess which parts of the audit worked for you, and against you. This creates the building blocks for improvement in your own audit styles and techniques.

The Weary and Disinterested Auditor

Auditing is like any other job; do one thing for too long and it becomes boring. The auditor who has had enough will not show interest or tenacity in the audit process. The problem is that lethargy is easily spread to others and difficult to detect and remove.

The converse situation, i.e. the auditor who has other responsibilities, is also a potential problem. In this situation, the audit may be delayed due to other priorities.

Auditee Types

Just as auditors come in all types, auditees also have differing personalities and may react differently to the audit process. The following are examples of the type of people you may encounter as an auditor:

The Disorganized Auditee

On occasions, auditors have walked into an audit and found:

- the auditee had gone out, or was at a meeting;
- the auditee made some comment similar to ‘ it’s not this time again’, or
- interruptions from the telephone or staff make it difficult for the audit to flow.

It is usually these people who then complain about audits taking too long. The answer to this is relatively simple. Stop the audit and suggest that it will be repeated at a more opportune time (explaining associated charging arrangements that may be in place).

Further action by the auditor such as holding of calls, requesting fewer interruptions etc. may also be necessary. Continuing difficulties should be highlighted to management for action.

Remember a good audit is one in which both the auditor and the auditee are organized.

The Hostile Auditee

Some auditees have difficulty in accepting another person, in this case a regulatory officer coming in and asking questions on their particular work activities. They can react negatively to what is seen as spying role. Win them over with suitable charisma; don't become defensive, antagonistic, easily distracted, shy or quiet and fail to carry out an effective audit.

Sometimes their reaction is defensiveness due to lack of understanding of the arrangement or system documentation, therefore encourage them to explain their system and how it operates in their own words.

It is also possible that an auditee is strongly negative to the whole concept of the Fumigation Accreditation Scheme and audit process. This may be as a result of lack of training or understanding in the benefits, approach and end objectives of the audit process. Further training of the auditee should be considered.

KNOWLEDGE OF THE AUDITOR

For an audit to be effective, the auditor must have a good knowledge of the requirements of the operational procedures. Without this knowledge, the auditor might:

- have difficulty in placing the correct level of importance on an aspect of the arrangement or procedure;
- ask questions outside the scope of the audit or responsibilities of the auditee;
- not be able to adequately recognise whether practical activities are being implemented correctly; or
- ask inappropriate questions that leaves doubt in the auditee's mind as to the competence of the auditor.

MODULE THREE

CONDUCTING AN AUDIT

INTRODUCTION

AIMS AND OBJECTIVES OF THIS MODULE

Module Aims

This is the third module in the Auditor Training Course and is titled ***Conducting an Audit***. The aim of this module is to give you an understanding on how to conduct an audit and deal with nonconformances.

Module Duration

This module should take approximately 3 hours to complete.

How is this Module structured

This module has four lessons:

How about also covering the basics of a desk audit?

Lesson One – The On-Site Audit

Lesson Two –Nonconformances

Lesson Three - Mock Audit

Lesson Four – Reporting the Audit

SUBJECTS COVERED IN THIS MODULE

The subjects covered in this module include:

Lesson One

1. What is an Audit
2. Stages of an Audit
3. The On-site Audit Process
4. Audit Scheduling and Auditor Assignment
5. Planning and Preparation
6. Performing the Audit

Lesson Two

1. Terms and Definitions
2. Nonconformances
3. Categories of Nonconformances
4. Exercising Discretion on Nonconformances
5. Negotiating and Documenting Corrective and Preventative Actions

Lesson Three

1. Mock Audit

Lesson Four

1. Audit Reporting
2. Follow-Up Audits
3. On-going Surveillance and Monitoring.

LESSON ONE
THE ON-SITE AUDIT

INTRODUCTION

What is an audit?

International Standard 9000:2005 defines an audit as -

A systematic, independent and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which audit criteria are fulfilled.

Audits are also often undertaken as part of the investigation or correction procedure because 'something went wrong'. Such audits are usually called investigatory audits and may result from nonconformances detected outside the audit situation.

STAGES OF AN AUDIT

The audit process can be broken into four stages and occupy varying proportions of committed time:

- Planning & preparation - 45%
- Performing audit - 35%
- Audit reporting - 10%
- Follow-up - 10%

This breakdown is an approximation only, but as you can see the emphasis is on the first two stages that may account for 80% or more of the total audit process

AUDIT SCHEDULING AND AUDITOR ASSIGNMENT

Audit Scheduling

Initial audits are undertaken prior to accreditation of a business.

Scheduled compliance audits are normally conducted between 6 months after accreditation if the arrangement operates for longer than six months of the accreditation year.

In subsequent years, scheduled compliance audits are normally conducted soon after re-accreditation, and 6 months after re-accreditation if the arrangement operates for longer than six months of the accreditation year.

Wherever possible, scheduled compliance audits are conducted when the arrangement is operating.

Where breaches of accreditation conditions are reported or suspected, investigatory audits are scheduled by the accrediting Authority (SIAQS).

Auditor Assignment

The auditor must have sufficient knowledge of the operational procedure, and the necessary skills and knowledge of their role and responsibilities as an auditor to successfully complete audits.

When assigning an auditor to a specific business, the following factors should be considered:

- Does the auditor have adequate experience and knowledge of the Operational Procedure?
- Does the auditor have any required specialist qualifications or technical expertise (fumigation training) necessary to undertake audit activities relevant to the Operational Procedure?
- Is the auditor independent of the auditee and are they free from bias or other influence?

An experienced auditor will normally accompany an inexperienced auditor until they have achieved the required practical experience to effectively lead an audit. Auditors normally undertake audits independently once they have completed a set number of audits, or once their Manager is satisfied the auditor has sufficient experience in conducting an audit.

PLANNING AND PREPARATION

Pre-Audit Contact with the Business

For all announced audits, auditors must advise the business of the impending audit and arrange a convenient time that suits the business and the auditor. It can be useful to also advise the business of the planned scope and objectives of the audit.

Pre-Audit Preparation

A critical element of preparation for an audit is knowledge of the business, including the previous audit results and previous or outstanding Nonconformance Reports issued. In preparation for an on-site audit, the auditor should review the auditor file and any previous audit reports, Nonconformance Reports and checklists (if applicable) and relevant operational procedures and should draft an audit checklist (see below).

The auditor needs to check whether any changes to the operations of the business have occurred since the business was accredited. Such changes may include change of ownership or change of signatories. Auditors must be aware of any outstanding Nonconformance Reports or rejection of product.

Pre-audit preparation can include review of information already available to the Accrediting Authority (SIAQS) and or requesting additional information from the auditee.

Drafting an Audit Checklist

In preparing for an on-site audit the auditor should prepare an *Audit Checklist.*

The audit checklist is a list of elements to be checked or steps to be taken in carrying out the audit. A checklist is used as a record of the information needed to enable you to confirm the system is in place and working.

Audit Checklists are prepared to:

- establish the understanding of staff as to their responsibilities and roles under the accreditation;
- check that processes, calibration and operations meet the requirements of the operational procedure;
- check that the required processes have been implemented and are operating in accordance with requirements of the operational procedure;
- check that records and system documentation are maintained accurately.

Reasons for using an audit checklist are to:

- assist the auditor performing and preparing the audit;
- provide objective evidence that the audit has been conducted,
  and that agreed features of the system were verified;
- provide a memory jogger for the auditor;
- provide historical data for future audits;
- allow the auditor to write notes during the audit;
- provide material to assist the auditor for the exit meeting and the audit report; and
- assist to develop sound audit skills.

Remember not all audits are the same and your approach to each audit may be different to meet different types of businesses and audit conditions. .

In preparing a checklist you should strive for:

- simplicity; and
- objectivity

In establishing what information you need, try asking questions in an open style -

WHAT (What occurs, what equipment or records are

involved)

WHO (Who does it, who takes it, who is accountable)

WHERE (What area, what location)

WHEN (What time, how often and when, other occasions)

HOW (How does this happen, how long etc.)

WHY (Why is this done)

EXERCISE ONE - PREPARING AUDIT CHECKLISTS

Instruction

As an Auditor you will be required to prepare an audit checklist.

Your task in this exercise is to review the attached Operational Procedure and in your group prepare at least five (5) questions you would ask in the audit situation.

Each person in the group should make a copy of the questions.

Each group will be required to present their questions to the group.

TIME ALLOWED: 30 minutes

MATERIALS REQUIRED:

- Writing materials
- An Operational Procedure
- Blank Audit Checklist

PERFORMING THE AUDIT

As previously outlined, the conduct of an on-site audit can be broken into four steps:

- Entry Meeting
- Audit
- Co-ordination of results (caucus)
- Exit Meeting

A question that is often asked is how long should an audit take. It is not possible to specify a minimum or maximum time that an audit should take due to the differing requirements of the Operational Procedures and the implementation in specific businesses. An audit should focus on obtaining sufficient objective evidence to make a decision as to whether the business is compliant with the requirements of the arrangement, rather than on the time taken.

The Entry Meeting

The Entry Meeting is a mostly brief meeting upon arrival at the business premises when the auditor summarizes the audit process and obtains initial information prior to commencing the evidence-gathering phase of the audit.

The purpose of the Entry Meeting is to:

- introduce the audit team;
- summarise the scope and objectives of the audit;
- provide an overview of the processes and activities to be undertaken during the audit;
- confirm that auditees, facilities, equipment and documents required by the audit team are available;
- confirm any OH&S issues that need to be addressed before commencing the audit;
- confirm the time for the Exit Meeting.

The Audit

This phase of the audit involves the auditor obtaining objective evidence through interviews with staff, observation of activities and examination of products, processes and records to verify the conformance (or nonconformance) of the business to the requirements of the arrangement.

The purpose of the audit is to confirm that the system is in place and ready to operate or operating in such a manner that the requirements of the relevant Operational Procedure will be/are being complied with.

In summary when performing audits:

- auditors should use checklists as a guide;
- auditors should seek and examine objective evidence by –
    - interview,
    - documents, forms and records,
    - observation of activities;
- auditors should record on the checklist the specific details of the objective evidence that has been examined;
- auditors should determine whether the activity complies with the requirements of the Operational Procedure; and
- auditors should accurately record the activity compliance on the checklist.

Collection of Audit Results (Caucus)

On completion of the audit, the auditor must decide whether to recommend accreditation, cancellation, suspension or amendment of the arrangement, issue Nonconformance Reports, negotiate corrective and preventive action to address any nonconformances, and determine whether a follow-up audit is required.

The audit caucus is an opportunity for the auditor(s) to check that all elements of the audit have been completed and that objective evidence for any nonconformance has been obtained.

Exit Meeting

The Exit Meeting is a brief meeting held at the completion of the audit to outline the audit findings.

At the Exit Meeting the auditor/s should:

- present the audit observations;
- detail any nonconformances and finalise any Nonconformance Reports;
- discuss corrective and preventive action to address any nonconformances, including whether a follow-

up audit is required;

- summarise the audit findings and advise the auditee of the audit results.

It is always important at the Exit Meeting to lead with positive audit findings before presenting any nonconformances.

LESSON TWO

NONCONFORMANCES

TERMS AND DEFINITIONS

The following is a list of commonly used terms important to this lesson and their definitions.

Term	Definition
Close out	the action(s) taken to rectify an existing nonconformity.
Corrective action	*corrective actions are steps that are taken to eliminate the causes of existing nonconformities in order to prevent recurrence. The corrective action process tries to make sure that existing nonconformities and potentially undesirable situations don't happen again.
Critical nonconformance	a nonconformance which, (in the opinion of the auditor), significantly compromises the effectiveness of the accreditation and/or will mean product certified under the arrangement does not comply with specified requirements.
Major nonconformance	a nonconformance where there is a breakdown in the system of treatment or other activity which compromises the assurance provided by the business's Accreditation, but where there is no evidence of a failure to comply with the specified quarantine requirements of the Operational Procedure.
Minor nonconformance	a nonconformance, which threatens neither the effectiveness nor assurance provided by the Accreditation but is a nonconformance with the requirements of the Operational Procedure.
Nonconformance	*means failure to comply with requirement, non-fulfillment of a specified requirement.

Nonconformance Report	a report listing or describing the identified non-conformance(s). Often abbreviated to NCR.
Preventive action	*steps that are taken to remove the causes of potential nonconformities or potential situations that are undesirable.

*Definition from ISO 9001

INTRODUCTION

Auditors will inevitably at audit identify where the requirements of an operational procedure have not been met. A nonconformance raised at audit means the business has failed to meet some or all of the requirements of an operational procedure.

Nonconformance Reports (NCR's) are raised by an auditor following detection of a nonconformance.

NCR's are issued to identify and record the nonconformance of a business and the corrective action and rectification. An auditor must be aware that serious and/or repeated nonconformances can lead to suspension and cancellation of an accreditation.

Similar to any decision during an audit, the identification of a nonconformance must be demonstrated by objective evidence collected by the auditor during the audit. **It is important to note nonconformance reports must not be used where a nonconformance is suspected but has not been substantiated by the collection of objective evidence. You cannot raise a nonconformance based on suspicion.**

CATEGORIES OF NONCONFORMANCES

The following are the categories of nonconformance and their definitions -

Critical Nonconformance

A critical nonconformance is a nonconformance which, (in the opinion of the auditor), significantly compromises the effectiveness of the accreditation and/or will mean product certified under the arrangement does not comply with specified requirements.

Examples of critical nonconformances are –

- operating outside the scope of the accreditation (i.e. certifying treatments when the accreditation is cancelled or suspended);

- knowingly not treating the product in accordance with the requirements of the operational procedure;
- not permitting entry of an auditor to a premises for an audit or allowing the auditor to access records, documents equipment etc;
- not allowing an auditor to interview employees;
- intimidation, abuse or similar of an Auditor.

Major Nonconformance

A major nonconformance is a nonconformance where there is a breakdown in the system of treatment or other activity which compromises the assurance provided by the business's Accreditation, but where there is no evidence of a failure to comply with the specified quarantine requirements of the Operational Procedure.

Examples of major nonconformances are –

- failure to keep records of treatment or inspection of produce;
- failure to carry out calibration of treatment or inspection equipment;
- permitting unauthorised personnel to issue Treatment Certificates.

Minor Nonconformance

A minor nonconformance is a nonconformance, which threatens neither the effectiveness nor assurance provided by the Accreditation but is a nonconformance with the requirements of the Operational Procedure.

Minor nonconformances are essentially administrative or sometimes technical in nature.

Examples of minor nonconformances are –

- failure to fully complete a treatment record;
- failure to sign a treatment record.

EXERCISING DISCRETION ON NONCONFORMANCES

As an auditor you will need to exercise some discretion in making a decision on the categorisation of nonconformances. The definitions, guidelines and examples are provided to assist the auditor in making a decision on the categorisation of a nonconformance.

The significance of the nonconformance will be affected by a number of issues and will, in specific instances, need to be considered when categorising nonconformances.

The following issues are to be considered when making a decision on the categorization of a nonconformance -

- was the nonconformance deliberate;
- the amount or quantity of product affected;
- the disparity to the specified requirement (i.e. the variation of a fumigant concentration to the prescribed standard);
- the frequency and time period with which the nonconformance has occurred;
- the potential or likely consequences of the nonconformance.

When raising a NCR an auditor will need to consider whether a follow-up audit will be needed to close out the NCR. In most cases a subsequent audit visit will be required and an appropriate date should be negotiated with the business at the Exit Meeting.

NEGOTIATING AND DOCUMENTING CORRECTIVE AND PREVENTATIVE ACTIONS

Corrective actions need to be implemented by the Accredited Business when the auditor has raised a nonconformance report. Nonconformances should be clearly explained to the Accredited Business by the auditor. The auditor shall discuss with the Accredited Business the timeframe for rectification of the nonconformance and a proposed close out date for the nonconformance report.

The auditor (if requested) may provide advice to the Accredited Business on corrective actions to rectify the nonconformance. Advice provided by the auditor shall not be binding and ultimately the Accredited Business shall be responsible for determining corrective and preventative action.

The following are steps to be taken when negotiating and documenting corrective and preventative actions -

1. **Provide information** – identify the nonconformance. Ensure the Accredited Business representative recognizes there is a nonconformity. Use objective, neutral terms to describe the nonconformity. Advise the representative a corrective plan is needed.
2. **Assess** – Can the nonconformance be solved if direction, support or education was provided to the Accredited Business?
3. **Listen** – What is the Accredited Business' suggested corrective action plan?
4. **Negotiate** – The corrective action plan should be negotiated with the Accredited Business and agreed upon by the Accredited Business and auditor.
    - The corrective action plan must be signed by the Accredited Business representative and the auditor.
    - The corrective action plan must be written and must identify the nonconformity which

has caused the need for corrective action.

- The corrective action plan must identify the corrective action to be taken to address the nonconformity.

5. **Implement** – The corrective action plan must have a start and end date. This is additional to the 'Proposed Follow Up' date on the Nonconformance Report. The 'Proposed Follow Up' date on the Nonconformance Report will reflect the level of seriousness of the breach and the ability of the Accredited Business to operate effectively with the breach.
6. **Monitor** – The auditor should monitor progress in correcting the nonconformance. The auditor can offer assistance if needed.
7. **Close-out** – The auditor shall assess and document the progress or lack of progress with the corrective action plan.
8. **Carry over** – It is at the discretion of the auditor whether corrective action plans can be 'carried over' to a new Nonconformance Report with the Accredited Business remaining operational or whether the business is to be suspended.

EXERCISE TWO – HOW TO WRITE NON CONFORMANCE REPORTS

Instruction

As an Auditor you will be required to write a report on your findings of the audit. As discussed there are two methods of reporting on the audit. The first is the Nonconformance Report and the second is the Audit Report.

Your task in this exercise is as follows -

- Individually review the scenarios assigned to your group and identify the nonconformances.
- Individually, complete Nonconformance Reports for each identified nonconformance. Nonconformances should be categorised as per previous guidelines.
- In your group, prepare to present the nonconformance to the business and to negotiate corrective and preventive actions to address the nonconformance and prevent recurrence with an appropriate time frame for implementation.

TIME ALLOWED:

60 minutes

MATERIALS REQUIRED:

- Nonconformance Report(s)
- Audit Report
- Operational Procedure - Fumigation with Methyl Bromide
- Scenarios

Scenarios

Scenario 1

1. You observe that the business has not maintained copies of Treatment Records they have issued.

2. The business is using a Fumiscope that the calibration has expired.

Scenario 2

1. Treatment records are sighted during the audit and comply with requirements, however no records are evident for the previous two days treatment. On questioning the Treatment Operator you are advised that treatment records are only completed at the end of each week's treatment.

Scenario 3

1. The fumigator has advised you that he ran out of methyl bromide last week. The business has however completed 2 Treatments Records following the date the methyl bromide ran out.

2. You observe that there are no permanent indicator marks on the methyl bromide dispenser.

Scenario 4

1. Observation of the fumigation operation shows that product is not receiving the full 24hrs for a 24hr fumigation.

2. The business is unable to provide a current copy of the Operational Procedure – Fumigation with Methyl Bromide

Scenario 5

1. On questioning the Fumigator you are advised that, although topping-up of the fumigant occurs, there is no documented top-up program.

2. The business uses scales for the dispensing of methyl bromide. However, there are no records that calibration of the scales has been undertaken since the commencement of operation.

LESSON THREE
MOCK AUDIT

INTRODUCTION

This is a practical lesson where you are required to apply the knowledge and skills you have learnt during this course. The mock audit will allow you to experience the process of preparing, conducting and reporting on an accreditation as an audit team.

This lesson will not allow for each participant to lead the audit. The trainer will lead the audit and you will be considered as auditors within the audit team. As such your responsibilities will be to assist the Lead Auditor and carry out any tasks assigned to you during the audit.

EXERCISE THREE - MOCK AUDIT

Instructions

As an Auditor you will be expected to prepare, conduct and report on an audit in the field. This exercise will give you an understanding of the challenges in doing this.

Your task in this exercise is as follows -

- Prior to the audit, individually prepare an audit checklist based on the Operational Procedure.
- Participate in the Entry Meeting at the business being audited.
- Conduct an on-site audit as an auditor as directed by the Lead Auditor. You may be asked to gather objective evidence by asking questions of staff, observing activities or examining records, products or processes.
- Participate in the audit caucus. Provide the audit team with your findings, discuss and prepare any Nonconformance Reports for nonconformances that may have been identified and help decide any recommendations to be made to the auditee.
- Participate at the Exit Meeting. Present any nonconformances you have identified and assist in discussing the audit findings.

TIME ALLOWED:

4 hours

MATERIALS REQUIRED:

Nil

LESSON FOUR
REPORTING THE AUDIT

AUDIT REPORT

An Audit Report is completed following each on-site audit. Audit reports must include the following information:

- the name/s of the auditor/s;
- the date and start and finish times of the audit;
- the scope of the audit including -
    - the name of the auditee,
    - the location of the audit,
    - the Accreditation being audited;
- the type of audit;
- a brief overview of the audit observations;
- details of any Nonconformance Reports issued during the audit;
- corrective and preventive action negotiated with the auditee to address any nonconformances and the time-frame for implementation; and
- the auditor's judgement on whether accreditation or continued accreditation is recommended.

It is preferable that the draft Audit Report be completed on-site at the time of the audit and not left until the auditor returns to their office. The completion of the Audit Report on-site allows the auditor to make notes on the audit while it is current in their mind.

A copy of the Audit Report must be provided to the business within xx working days of completion of the audit. A copy of the Audit Report, any NCR's issued at the audit and completed Audit Checklist must be provided to the xx within ten working days of completion of the audit.

The Audit Report and attached NCR's (if any) and completed Audit Checklist are filed for the arrangement.

EXERCISE FOUR - HOW TO REPORT THE AUDIT

Instruction

This exercise follows the Mock Audit Exercise. After completing the audit and identifying and reporting any nonconformances your next step is to write an Audit Report.

Your task in this exercise is as follows -

- In your group discuss your findings on the mock audit and how you would report them on the Audit Report.
- After deciding how to report the audit individually complete an Audit Report.

TIME ALLOWED:

30 minutes

MATERIALS REQUIRED:

- Nonconformance Report(s)
- Audit Report
- Mock Audit details.

FOLLOW-UP AUDIT

At a follow-up audit the auditor checks that nonconformances noted in the original audit have been adequately corrected and that the business is now suitable for accreditation or reinstatement of accreditation. Only those requirements that were lacking need to be checked during a follow-up audit.

Follow-up audits should only be undertaken once the accredited business has advised that a required corrective and preventive action(s) have been implemented to address and close-out the nonconformance(s).

Where corrective and preventive action has not been implemented within agreed time frames, accreditation may need to be suspended until such time as the follow-up audit has been successfully completed and the Nonconformance Report closed-out.

ON-GOING SURVEILLANCE AND MONITORING

After an arrangement has been accredited, routine monitoring and surveillance will be undertaken to verify continued effective operation of the arrangement. The business may be monitored by scheduled and unscheduled compliance audits, investigatory audits and surveillance.

MODULE FOUR

ACCREDITING INDIVIDUALS AND BUSINESSES

INTRODUCTION

AIMS AND OBJECTIVES OF THIS MODULE

Module Aims

This is the fourth module in the Auditor Training Course and is titled ***Accrediting Individuals and Businesses***.

The aim of this module is to give you an understanding on how to grant, cancel and suspend an accreditation.

Module Duration

This module should take approximately xx hours to complete.

How is this Module structured

This module has one lesson:

Lesson One – Granting, Cancelling and Suspending an Accreditation

SUBJECTS COVERED IN THIS MODULE

The subjects covered in this module include:

Lesson One

1. Accrediting of an Arrangement
2. Cancellation, Suspension of an Accreditation

LESSON ONE

GRANTING, CANCELLING AND SUSPENDING AN ACCREDITATION

INTRODUCTION

After completing a desk audit or on-site audit, the auditor must make a decision as to recommend accreditation or to recommend cancellation or suspension of the arrangement.

To make this decision all auditors must be aware of the correct procedures for dealing with accreditation under the Accreditation Scheme.

ACCREDITING AN ARRANGEMENT

Auditors are generally not solely responsible for granting or refusing an accreditation. Auditors are responsible for confirming the compliance of an accreditation to specified requirements. Based on the result of an audit, an auditor will recommend (or not recommend) the accreditation of a business.

The responsibility for granting, cancelling or suspending an accreditation rests with the person or persons who have been delegated that responsibility. This is generally the CEO or higher-level managers within a quarantine authority.

Auditors will need to use discretion and have a valid reason for recommending the granting or refusal of an accreditation. In reaching a decision, auditors must weigh up the rights of the applicant with the need to ensure the effectiveness of an arrangement and the integrity of the SIAQS certification.

Accreditation Process

The following steps will normally apply to accreditations granted under the Accreditation Scheme -

- Application for Accreditation;
- Desktop Audit;
- Initial Audit;
- Compliance Audit (2 annually)

2nd Year

- Application for Re-accreditation;
- Desktop Review;
- Re-Accreditation;

- Compliance Audit (2 annually)

3rd Year (and so on)

- Application for Re-accreditation;
- Desktop Review;
- Re-Accreditation;
- Compliance Audit (2 annually)

Factors to be Considered When Granting or Refusing an Accreditation

A decision whether or not to grant an accreditation will be broadly based on the following factors -

- applicant's knowledge and ability to comply with the Operational Procedure;
- staff understanding of the Accreditation system and their individual responsibilities and duties; and
- whether the system has been implemented to ensure that the business functions in accordance with the Operational Procedure.

The person (usually the CEO or higher level managers within the quarantine authority) granting the accreditation must be satisfied that all accreditation conditions have been met and the system implemented by the business meets the requirements of the Operational Procedure covering the Accrediation.

Granting Initial Accreditation

Following receipt of an Application for Accreditation and an audit report recommending accreditation, the delegate responsible, if satisfied that the accreditation conditions have been met, will normally grant accreditation.

Accreditation

If as the result of an initial audit, accreditation is recommended then the business will be audited twice annually.

Re-accreditation

A business will normally be re-accredited on receipt of an Application for Accreditation for renewal of the Accreditation in years subsequent to the initial accreditation. Re-accreditation is provisional on no outstanding nonconformances against the business which would prevent re-accreditation.

In certain circumstances, the delegate may not grant re-accreditation until a satisfactory compliance audit has been conducted. These circumstances may include:

- an accreditation has outstanding nonconformances (usually major or critical) that must be closed prior to re-accreditation;
- an arrangement which has lapsed and the business is wanting reaccreditation;
- an arrangement where key staff or equipment has changed significantly since the previous compliance audit.

Cancellation or Suspension

An auditor will face circumstances where it is necessary to recommend canceling or suspending an accreditation. Whilst it is not possible to outline all the circumstances under which such action may become necessary some guidance for such action is provided below.

Cancellation or Suspension

Failure to comply with the Operational Procedure will breach the accreditation conditions and will therefore be grounds for suspension or cancellation of an accreditation. Another may be failure of an accredited business to give access to facilities or staff or to pay fees.

Factors to be Considered When Cancelling or Suspending an Accreditation

Cancelling or suspending an accreditation may cause significant financial loss to a business. It should be noted however that failure of a business to comply with the conditions of accreditation may compromise the integrity of the issuing country's phytosanitary certificates.

Suspension

Remember, immediate suspension should only be exercised where a failure to suspend would compromise the effectiveness of the scheme or the confidence of an overseas authority.

The auditor should refer a recommendation to immediately suspend a business to the appropriate delegate.

EXERCISE ONE – WHEN TO SUSPEND, CANCEL &/OR AMEND

Instruction

As an Auditor you will be required to recommend the suspension or cancellation of an Accreditation.

Your task in this exercise is as follows -

Individually review the scenarios assigned to your group and decide what recommendations you would make.

In your group, prepare to present your recommendations and your reasons behind them.

TIME ALLOWED: 30 minutes

MATERIALS REQUIRED:

Writing materials

Scenarios

Scenarios

Scenario 1

One container of fumigated sawn timber has been received overseas accompanied by a SIAQS phytosanitary certificate. The phytosanitary certificate declares that the timber has been fumigated under the business's fumigation accreditation.

An officer of the importing country's quarantine authority has inspected the consignment and found that the consignment details on the phytosanitary certificate does not match the consignment (different type of timber and quantity).

An investigatory audit is carried out by SIAQS and evidence is gathered that two consignments of sawn timber were prepared for dispatch from the business that day. One consignment was treated and certified. The second consignment was untreated and uncertified and was intended for a non-quarantine market that did not require treatment and certification.

The two consignments were accidentally mixed up when loading into the container. The treated and certified product was consigned to the non-quarantine market and the untreated and uncertified product was consigned with the phytosanitary certificate to the quarantine market.

Scenario 2

During a compliance audit a business's treatment records are sighted. Records indicate two treatments were release when the end point methyl bromide reading was below the minimum concentration required. This anomaly wasn't picked up when the quarantine officer signed the phytosanitary certificate attesting to the treatment.

Scenario 3

During a compliance audit a number of nonconformances are identified. The business owner becomes abusive and insulting toward the auditor. The auditor advises the owner that if he continues to behave in this manner he will have to abandon the audit. The owner tells the auditor to leave the property and the auditor abandons the audit.

Scenario 4

Live termites are identified in a consignment of sawn timber certified under the Operational Procedure – Fumigation with Methyl Bromide.

The quarantine authority in the importing country advises that no further fumigated product will be accepted from the business until the investigation is completed.

An investigatory audit is conducted by SIAQS and no nonconformances are found.

Scenario 5

Live woodborers are intercepted (in the importing country) in a consignment of timber treated and certified under the Operational Procedure – Fumigation with Methyl Bromide. The importing country requests SIAQS to perform an investigation to ascertain what may have gone wrong.

The quarantine authority in the importing country also advises that no further fumigated product will be accepted from the accredited business until the investigation is completed.

An investigatory audit is conducted by SIAQS. Treatment records do not correspond to treatment details provided on the certificate. On questioning the Authorised Signatory who signed the certificate, it is revealed that the order for the timber was unexpected and they had no treated timber to fill the order. The Authorised Signatory advises that the business owner had instructed them to complete the treatment certificate even though they knew the produce they were certifying had not been fumigated.

APPENDIX 1 – Terms and Definitions

Term	Definition
Accreditation	to accredit a supplier (business) to perform a specific function (fumigate) to an agreed requirement.
Accredited business	a person or body approved to conduct fumigations under the Fumigation Accreditation Scheme by the Accrediting Authority, the Solomon Islands Agriculture Quarantine Service.
Accrediting authority	for the purposes of the Fumigation Accreditation Scheme, the Solomon Islands Agriculture Quarantine Service.
Announced audit	an audit where the auditee has been advised in advance of the audit.
Audit	a verification activity aimed at evaluating the conformance of a system.
Auditor	a person qualified to perform audits.
Close out	the action(s) taken to rectify an existing nonconformity.
Corrective action	*corrective actions are steps that are taken to eliminate the causes of existing nonconformities in order to prevent recurrence. The corrective action process tries to make sure that existing nonconformities and potentially undesirable situations don't happen again.
Critical nonconformance	a nonconformance which, (in the opinion of the auditor), significantly compromises the effectiveness of the accreditation and/or will mean product certified under the arrangement does not comply with specified requirements.
Desk Auditor	an auditor assigned to undertake a desk audit.
Fumigation Accreditation Scheme	the framework, responsibilities, processes and resources needed for implementing the requirements of the accreditation for fumigation with methyl bromide.
Major nonconformance	a nonconformance where there is a breakdown in the system of treatment or other activity which compromises the assurance provided by the business's Accreditation, but where there is no evidence of a failure to comply with the specified quarantine requirements of the Operational Procedure.
Minor nonconformance	a nonconformance, which threatens neither the effectiveness nor assurance provided by the Accreditation but is a nonconformance with the requirements of the Operational Procedure.

Nonconformance	*means failure to comply with requirement, non-fulfillment of a specified requirement.
Nonconformance Report	a report listing or describing the identified nonconformance(s). Often abbreviated to NCR.
On-site Auditor	an auditor assigned to undertake an on-site audit.
Preventive action	*steps that are taken to remove the causes of potential nonconformities or potential situations that are undesirable.
Quality	*Degree to which a set of inherent characteristics fulfills requirements Or Suitability for purpose.
Quality Assurance (QA)	*Quality assurance is a set of activities intended to establish confidence that quality requirements will be met. QA is one part of quality management. Or Is this right or fit for purpose?- (controlling the processes to make a quality product)
Quality Management (QM)	*A quality management system is a set of interrelated or interacting elements that organizations use to direct and control how quality policies are implemented and quality objectives are achieved. Or Are we doing it right and how can we do it better?
Unannounced audit	an audit where the auditee has not been advised in advance of the audit.

*ISO 9000

Auditor Training Course

Course Introduction

Auditor Training Course

- Course Aims and Objectives
  - To provide you with an understanding of auditing terminology and techniques and the skills necessary to undertake an audit.

Auditor Training Course

- Course Aims and Objectives
  - Upon completion of the course you should be able to:
    - Demonstrate an understanding of the terms used in auditing
    - Plan, undertake and report on audit findings
    - Understand how the Fumigation Accreditation Scheme works

Auditor Training Course

- Course Outline
  - Course Structure
    - The Auditor Training Course is made up of four modules each covering different topics
  - The Modules
    - Background to Quality and Quality Management and the Fumigation Accreditation Scheme
    - Introduction to Auditing
    - Conducting and Audit
    - Accrediting an individual/business

Auditor Training Course

- Prerequisites
  - There is no prior knowledge of auditing or prerequisite skills required to undertake the course
  - Before undertaking the course however, you should:
    - Be willing to learn
    - Be prepared to listen, ask questions and join in

Auditor Training Course

- Course Notes
  - Have been written to assist you in developing the required skills to successfully complete the course
  - The notes should be read in conjunction with the teaching tools and other additional information provided by the trainer
  - Additional note taking is not necessary as the information required to achieve the learning outcomes is contained in the notes

Auditor Training Course

- Assessment
  - At the end of each module you will be required to answer a number of short and multiple choice questions
  - During the course you will also undertake exercises to demonstrate your knowledge and skills
  - Supervised Audit
    - Although not covered in this course, it is ideal to have a second assessment whereby trainee auditors are assessed in the field (performing audits) under supervision

Auditor Training Course

- Assessment
  - Re-assessment may be requested at any time if you have completed an entire module and are deemed not yet competent
- Other Considerations
  - You may request special consideration in relation to assessment. If you have literacy problems or come from a non English speaking background you should contact the trainer as soon as possible

Auditor Training Course

- Exercise One – Group Exercise
  - Auditing involves interaction via questioning, listening and speaking to individuals and small groups. This exercise will assist you in improving your communication skills and allows the group to get to know you.

Auditor Training Course

Module One

Background to Quality Assurance and Quality Management and the Fumigation Accreditation Scheme

Auditor Training Course

- Module Aims
  - The aim of this module is to provide you with an introduction to quality assurance/quality management principle and to describe the structure and supporting elements of the Fumigation Accreditation Scheme

Auditor Training Course

- Lesson Topics
  - Lesson One – Introduction to Quality Assurance
    - Terms and definitions
    - Quality Assurance
    - Hazard Analysis and Critical Control Points (HACCP)
  - Lesson Two – Introduction to the Fumigation Accreditation Scheme
    - Background to the Fumigation Accreditation Scheme
    - Differences between the Fumigation Accreditation Scheme and other quality management systems
    - The Fumigation Accreditation Scheme versus end-point monitoring
    - The benefits of the Fumigation Accreditation Scheme to the SIAQS and the accredited business

Auditor Training Course

- Lesson Topics (cont…)
  - Lesson Three – Structure of the Fumigation Accreditation Scheme
    - Structure of the Fumigation Accreditation Scheme
    - Supporting elements of the Fumigation Accreditation Scheme

Auditor Training Course

- Lesson One – Introduction to Quality Assurance
  - Definitions
    - Quality
    - Quality Assurance
    - Quality Management
    - Nonconformance

Auditor Training Course

- History
  - Originally one craftsman was responsible for the manufacture (and quality) of the item they were working on.
  - With the industrial revolution, workers were supervised and this person assumed responsibility for the quality of the work.
  - Complexity of products being manufactured and the advent of both world wars led to better quality control approach.
  - After the second world war, quality assurance was introduced to the Japanese manufacturing industry and later Korean manufacturing industry

Auditor Training Course

- Quality Standards
  - AS/NZS ISO 9000 series
  - Freshcare Code of practice (fresh fruit and vegetables)
  - DAFF (formerly the Australian Quarantine and Inspection Service) quality systems including Compliance Agreements, Approved Quarantine Directives
  - Interstate Certification Assurance for fresh fruit and vegetable (all States and Territories of Australia)

Auditor Training Course

- Quality Standards
  - Quality Standards in Australia are certified by accredited certification companies.

Auditor Training Course

- HACCP
  - HACCP developed in the 1960's for the North American Space Program
  - HACCP used to ensure astronauts didn't get food poisoning
  - HACCP is based on quality assurance and used often with quality assurance manuals
  - HACCP is used in many standards
- HACCP Plan
  - Documented process to apply the HACCP process

Auditor Training Course

- HACCP
  - The Procedural Manual - Fumigation with Methyl Bromide does not use HACCP
  - As an auditor you may come across HACCP wen auditing a business
  - When auditing the Procedural Manual, your role is not to audit HACCP Plans or other quality system documentation

Auditor Training Course

- Lesson Two – Introduction to the Fumigation Accreditation Scheme
  - Definitions
    - Accreditation
    - Fumigation Accreditation Scheme

Auditor Training Course

- About the Fumigation Accreditation Scheme (FAS)
  - Developed to provide a cost effective alternative to supervising fumigation treatments by government inspectors
  - FAS utilizes the principles of quality management whereby an accredited business assumes responsibility for the treatment
  - The accrediting authority (SIAQS) ensure the treatment processes are in place through a program of audits
  - FAS is described as a 'Prescriptive Quality Management System' in that the requirements is developed and documented by SIAQS and relevant industry groups

Auditor Training Course

- Difference between FAS and Government Supervision
  - Supervision of treatment relies on SIAQS to check during or end of fumigation process. FAS based on quality management principles that ensure checks and control measures are built into the system rather then relying on the end result
  - It is the accredited business and its staff that are responsible for assuring the product complies with the relevant conditions, not another party such as the SIAQS

Auditor Training Course

- Benefits of the Fumigation Accreditation Scheme
  - The benefits will differ depending on the business
    - Flexibility in planning as business not reliant on SIAQS to supervise treatments
    - Improved operational control with staff roles and responsibilities clearly articulated
    - Improved awareness by staff
    - Improved staff participation
    - Potential for reduced certification costs

Auditor Training Course

- Benefits of the Fumigation Accreditation Scheme (cont…)
  - Benefits to whole of industry and government include:
    - Government resources diverted to other high end priority activities (e.g. Surveillance and monitoring)
    - Potential for reduced disruptions to market access through improved quarantine systems
    - Increased confidence that product meets overseas quarantine requirements
    - Reduced complexity and variability when compared to other quality systems

Auditor Training Course

- Lesson Three – Structure of the Fumigation Accreditation Scheme
  - Administrative procedures provide detail on how the Fumigation Accreditation Scheme is managed and administered by SIAQS
    - Administrative Procedures cover:
      - Auditing arrangements
      - Audit reporting
      - Dealing with nonconformance

Auditor Training Course

- The Operational Procedure
  - The Operational Procedure describes the requirements for accreditation.
    - The Operational Procedure details:
      - The quarantine requirement to be met
      - The scope of the procedure (including pests)
      - The responsibilities of staff
      - The principles of operation and standards
      - Processes and process controls that must be implemented
      - The records and documentation that must be maintained

Auditor Training Course

- Work Instruction
  - Work Instructions are prepared that provide specific instructions on how to carry out an activity relevant to the operational procedure
  - Examples of Work Instructions
    - Guidelines for the completion of forms, certificates and other documentation
    - Calibration and testing of equipment (e.g. fumiscope, miniRAE)

Auditor Training Course

- Module One Summary
  - What did we discuss?
    - Terms and Definitions
    - Quality Assurance
    - HACCP
    - Background to the Fumigation Accreditation Scheme
    - Differences between the Fumigation Accreditation Scheme and other Quality management Systems
    - The benefits of the Fumigation Accreditation Scheme
    - Structure and Supporting Elements of the Fumigation Accreditation Scheme

Auditor Training Course

Module Two

Introduction to Auditing

Auditor Training Course

- Module Aims
  - The aim of this module is to provide you with an introduction to the objectives of auditing

Auditor Training Course

- Lesson Topics
  - Lesson One – Purpose and Types of Audits
    - Terms and definitions
    - Purpose of auditing
  - Lesson Two – Understanding the Operational Procedure – Fumigating with Methyl Bromide
    - Operational Procedure
    - Elements of the Operational Procedure

Auditor Training Course

- Lesson Topics
  - Lesson Three
    - Auditing Techniques, Methods and Tips
      - Collecting data
      - Auditing Techniques
      - Auditing Methods
      - Listening Skills
  - Lesson Four
      - Roles and responsibilities of auditors
      - Auditor Attributes
      - Human Factors in Auditing
      - Knowledge of the Auditor

Auditor Training Course

- Lesson One – Purpose and Types of Auditing
  - Terms and Definitions
    - Announced audit
    - Audit
    - Auditor
    - Desk Auditor
    - On-site Audit

Auditor Training Course

- The purpose of an audit:
  - Confirm the Accreditation Applications are complete
  - Confirm the information contained in the application is correct
  - Confirm procedures and equipment are in place and operating
  - Confirm staff are trained and aware of responsibilities
  - Investigate nonconformances
  - Check changes to the accreditation
  - Confirm previous nonconformance have been rectified

Auditor Training Course

- Benefits of the Audit
  - Stimulates positive improvement cycle
    - Helps a business identify defects in its product or procedures
    - Stimulates corrective and preventative actions

Auditor Training Course

- Types of Quality System Audits
  - First party or internal
  - Second party or customer
  - Third party or external
- Types of FAS Audits
  - Desk
  - On-site – (initial, compliance, follow up, investigatory)

Auditor Training Course

- Desk Audits
  - Desk audit is the first step in accrediting a business
  - Confirms each application is complete
  - Provides advice to applicants on the action required to complete an application

Auditor Training Course

- On-site audits
  - Four types of on-site audits
    - Initial or (accreditation audit)
    - Compliance
    - Follow-up
    - Investigatory

Auditor Training Course

- Initial Audits
  - Initial audits conducted prior to the initial accreditation of the business
  - Initial audits are undertaken to confirm the applicant business has implemented the processes and carried out staff training
  - Initial audits are always announced

Auditor Training Course

- Compliance Audits
  - Compliance audits are conducted following accreditation of a business
  - Compliance audits may be scheduled or unscheduled
  - Compliance audits are intended to confirm that the accreditation continues to operate in accordance with the procedure
  - Compliance audits may be scheduled or unscheduled
  - May be announced or unannounced

Auditor Training Course

- Follow-up Audits
  - Follow up audits are conducted following a nonconformance detected during a previous audit and are undertaken to verify appropriate corrective actions are in place
  - The scope of the follow up audit is limited to ensuring that any outstanding non conformances have been addressed
  - Follow up audits are always announced

Auditor Training Course

- Investigatory Audits
  - Investigatory audits are conducted to investigate reported or suspected non conformance of an accredited business
  - Investigatory audits are carried out to confirm whether a nonconformance exists, and where appropriate, identify the cause
  - Investigatory audits may be announced or unannounced

Auditor Training Course

- Lesson Two – Understanding the Operational Procedure – Fumigation with Methyl Bromide
  - Operational Procedures specify the requirements that a business must meet to gain accreditation to certify product for a specified requirement
  - Auditors must have a comprehensive understanding of the procedure and accreditation process to be able to effectively audit the accreditation

Auditor Training Course

- Elements of an Operational Procedure
  - Purpose
    - Outlines the intention of the Operational Procedure
  - Scope
    - Outlines the area of application of the Operational Procedure
    - The scope defines the treatment covered
  - References
    - Details other documents that have relevance on the activities covered by the Operational Procedure

Auditor Training Course

- Elements of an Operational Procedure (cont…)
  - Definitions
    - Clarifies a word, group of words, statement or acronym which has a specific interpretation or application within the Operational Procedure or may not be universally understood.
  - Responsibility
    - Details the responsibilities assigned to each position identified in the Operational Procedure
  - Requirement
    - Specified the quarantine requirement that certified product

Auditor Training Course

- Elements of an Operational Procedure (cont…)
  - Procedures
    - Describes in detail the processes that must be implemented by the business for the Authority (SIAQS) to accredit the business
    - The procedure section outlines the system and system controls that apply under the Operational Procedure
  - Attachments
  - Lists any documents attached to the Operational Procedure e.g. example forms, AQIS Ready Reckoner

Auditor Training Course

- Exercise One – Operational Procedures
  - As an auditor you are expected to know Operational Procedures and be able to identify and explain the requirements in the Operational Procedure
  - Your task is to familiarise yourself with the elements of the Operational Procedure and identify its requirements

Auditor Training Course

- Lesson Three – Collecting Data, Auditing Techniques and Tools
  - Data can be defined as-
    - *'Facts and statistics collected together for reference and analysis'*
  - There are two types of data
    - Subjective – based on experience, intuition, opinion and sometimes called gut feeling
    - Objective – based on verifiable events including observation

Auditor Training Course

- Collecting data
  - The auditor seeks objective evidence through audit (interviews) with staff, observation of activities and examination of equipment, records and documents to confirm the conformance or nonconformance of the business to the requirements of the Operational Procedure.
  - It is important to remember that the purpose of the audit is to determine that the system is in place and ready to operate or operating in such a manner that the requirements of the relevant Operational Procedure will be complied with.

Auditor Training Course

- How to Sample Records
  - When examining system records, it is usually not necessary for the auditor to sight and review every record completed by the business under the accreditation. Auditors should select a representative sample of records and examine this sample to verify compliance with requirements.
  - A simplified sampling methodology for determining the number of records to be sampled based on the number of records completed since the last audit follows –
    - 1 to 5 records - each record to be audited;
    - 6 to 30 records - at least every third record and not less than 5 records to be audited;
    - 31 records or more - at least every fifth record and not less than 10 records to be audited.

Auditor Training Course

- Auditing Techniques
  - Document Tracking
    - This technique involves tracing a small number of documents/records from their creation to their filing, checking the compliance of a number of functions along the way.
  - Traceback
    - This technique involves traceback through the system. For example, it would be possible to take a completed Phytosanitary Certificate returned from overseas and trace it back through the system, examining associated records of treatment, equipment, calibration to determine the effectiveness and operation of the system.

Auditor Training Course

- AUDITOR APPROACHES/TOOLS
  - Three important approaches are available to an auditor to gather information (data) on which to base decisions and report the findings of an audit:
    - observing
    - questioning
    - listening

Auditor Training Course

- Observing
  - Non-verbal communication forms a significant component of an audit. Auditors need to be observant and conscious of the surroundings in which they are auditing. In addition, auditors must be able to interpret body language of the auditee. Important clues may be obtained from observing gestures and mannerisms.
  - The auditor can learn about the operating procedures in place and the related responsibilities of staff by observing the system processes as they are performed. An example would be to ask the fumigator to demonstrate how they release the methyl bromide into the enclosure.

Auditor Training Course

- Questioning
  - It is necessary to understand the difference between an open and closed question. An open question incites a response of some detail and does not allow the person to simply answer yes or no.

    A closed question usually asks for a simple yes or no answer. An example of an open question is, "How do you feel about this course?" while an example of a closed question is "Do you like this course?".
  - Because open questions encourage people to share more information, they are generally more helpful than closed questions in an audit situations.
  - A key factor in gathering data using an interview or questioning technique is to gain the co-operation of the interviewee.

Auditor Training Course

- Question Types
  - **Open ended**
    - Introduce the topic area. The open-end question should be broadly framed. It should call for an explanatory answer and should not permit a "yes-no" type answer.
      - eg. "Could you tell me about how you dispense the methyl bromide?"
      - rather than "Do you use a volumetric cylinder to dispense the methyl bromide?"

Auditor Training Course

- Question Types
  - **Constructive**
    - These questions are designed to get the auditee to expand upon their answers. The key words in a development question would be "How" and "What". Their most important characteristic is, like a lead-off question, they do not call for a "yes-no" type answer.

Auditor Training Course

- Question Types
  - **Evaluative**
    - This question is designed to allow you to check your understanding of facts and ideas which the auditee has communicated to you. Explain your understanding of what the auditee has told you and confirm with a question like:

      "Would that be an correct appraisal?"
    - If confirmed by the auditee, you could ask something like:

      "Is there anything I missed?"

Auditor Training Course

- Question Types
  - **Clarifying**
    - This is the natural question to follow the evaluative question in seeking more information. It is based on "Why". Take care not to ask a blunt "Why?" but to refine it with a polite delivery. Affinity can be lost immediately with an approach that appears to be abrupt or dominant.

      E.g. "I have one question. Do you know why.....?"

Auditor Training Course

- Questioning Types
  - **Confirmation**
    - This type of question is used to finish questions in the area, before moving to the open ended question in the next cycle.
      eg "Thank you. You have made it a lot clearer. Would I be correct that we've looked at every aspect of.....?"'
    - The purpose here is to create the right kind of perspective - to reassure the auditee that the end-result is that he will ultimately benefit. It has been said of this type of interview that 75% of the skill of the interview is in the planning and preparation.

Auditor Training Course

- Listening Skills
  - People tend to spend more time listening than they spend on any other communication activity, yet some people never learn to listen well. One reason is that they develop poor listening habits that continue with them throughout life.

Auditor Training Course

- Listening Skills
  - Poor Listening Skills include:
    - Not attentive
    - Listening but not hearing
    - Rehearsing
    - Interrupting
    - Hearing what they expect
    - Feeling defensive
    - Point of disagreement

Auditor Training Course

- Listening Skills
  - Improve your listening skills
    - People can improve their listening by identifying their own poor listening habits and make an effort to change them.
    - If you pay attention to the situations that invite bad listening behavior you can consciously attempt to change bad habits. An example, if you realise you are pretend listening stop the speaker and ask him to repeat.
    - The more you become conscious of poor listening behavior the more likely you are to change poor habits. As well as ridding yourself of bad listening habits, people can acquire positive listening habits. Listed below are descriptions of effective listening behaviors.

Auditor Training Course

- Listening Skills
  - Improve your listening skills
    - Being attentive
    - Listening for the message
    - Evaluating correctly
    - Repeating what was heard

Auditor Training Course

- Exercise Two
  - As an auditor you will require good questioning and listening skills. This exercise is used to demonstrate these skills.
  - In this exercise you will form pairs and one person will take instructions and the other will be the instructor.
  - The person taking the instructions will be blind folded and given a small item that they have to build by asking questions of the instructor.

Auditor Training Course

- Lesson Four – Roles and Responsibilities of Auditors
  - Auditors are responsible for:
    - complying with audit requirements;
    - communicating and clarifying audit requirements;
    - planning and carrying out assigned audit responsibilities effectively and efficiently;
    - reporting audit results;
    - treating privileged information with discretion.

Auditor Training Course

- The responsibility for conducting an audit therefore requires that an auditor should have at least the following -
  - thorough knowledge and understanding of the relevant Operational Procedure;
  - competent people skills and skills in examining, questioning, evaluating and reporting;
  - the ability to reach decisions (separate fact from opinion, compare evidence with requirements); and
  - practical experience to recognise deficiencies in the operating system and recognise incomplete or misleading information.

Auditor Training Course

- Auditor Attributes
  - Desirable auditor attributes
    - Sensitive
    - Tolerant
    - Attentive
    - Inquiring mind
    - Communicator
    - Industrious
    - Resilient
    - Unbiased
    - Professional
    - Articulate
    - Analytical
    - Reliable
    - Listens
    - Non judgmental

Auditor Training Course

- Auditor Attributes
  - Undesirable auditor attributes
    - Unprofessional
    - Narrow minded
    - Impatient
    - Disruptive
    - Argumentative
    - Not observant
    - Naïve
    - Lazy
    - Pedantic
    - Not prepared
    - Accepting
    - Wants to be loved by all

Auditor Training Course

- Auditor Attributes
  - Human Factors in Auditing
    - Potential problems in the contact between the auditor and the auditee can be divided into three broad areas, namely:
      - attributes and personality of the auditor;
      - attributes and personality of the auditee;
      - auditor knowledge

Auditor Training Course

- Auditor Attributes
  - Human Factors in Auditing
    - There are many different types of auditors
    - The following are examples of auditor types
      - Failing the Business
      - The Dictator
      - A Friend
      - The Suspicious Auditor
      - The Friendly Introduction
      - The Weary Auditor

Auditor Training Course

- Auditee Attributes
  - Just as auditors are all different, auditees are also different
  - The following are some examples of the type of auditee you may encounter
    - The Disorganised Auditee
    - The Aggressive Auditee

Auditor Training Course

- **KNOWLEDGE OF THE AUDITOR**
  - For an audit to be effective, the auditor must have a good knowledge of the system requirements and related Operational Procedures. Without this knowledge, the auditor might:
    - place the improper level of importance on an aspect of the arrangement or procedure;
    - ask questions well outside the scope of the audit or responsibilities of the auditee; or
    - ask questions which would have the auditee doubt the competence of the auditor.

Auditor Training Course

- Module Two – Summary
  - What did we discuss
    - Purpose of auditing
    - Types of audits
    - Operational Procedure
    - Elements of the Operational Procedure
    - Collecting Data
    - Auditing Technique
    - Auditing Tools
    - Listening

Auditor Training Course

- Module Two – Summary (cont…)
  - What did we discuss
    - Roles and responsibilities of auditors
    - Auditor attributes
    - Human factors in auditing
    - Knowledge of the auditor

Auditor Training Course

Module Three

Conducting an Audit

Auditor Training Course

- Aims and Objectives
  - The aim of this module is to give you an understanding on how to conduct an audit and deal with nonconformances.

Auditor Training Course

- Lesson Topics
  - Lesson One – The On-Site Audit
    - What is an Audit
    - Stages of an Audit
    - The On-Site Audit Process
    - Audit Scheduling and Auditor Arrangement
    - Planning and Preparation
    - Performing the Audit
  - Lesson Two – Nonconformances
    - Terms and Definitions
    - Nonconformances
    - Categories of Nonconformances
    - Exercising Discretion on Nonconformances

Auditor Training Course

- Lesson Topics
  - Lesson Three – Mock Audit
  - Lesson Four – Reporting the Audit
    - Audit Reporting
    - Follow Up Audits
    - Ongoing Surveillance and Monitoring

Auditor Training Course

Lesson One

The On-Site Audit

Auditor Training Course

- What is an Audit?
  - International Standard 9000:2005 defines an audit as -
    - A systematic, independent and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which audit criteria are fulfilled.
  - Audits are also often undertaken as part of the investigation or correction procedure because 'something went wrong'. Such audits are usually called investigatory audits and may result from nonconformances detected outside the audit situation.

Auditor Training Course

- Phases of an Audit
  - The audit process can be broken into four stages and occupy varying proportions of committed time:
    - Planning & preparation - 45%
    - Performing audit - 35%
    - Audit reporting - 10%
    - Follow-up - 10%
- This breakdown is an approximation only, but as you can see the emphasis is on the first two stages that may account for 80% or more of the total audit process

Auditor Training Course

- Audit Scheduling and Auditor Assignment
  - Initial audits are undertaken prior to accreditation of a business.
  - Scheduled compliance audits are normally conducted between 6 months after accreditation if the arrangement operates for longer than six months of the accreditation year.
  - In subsequent years, scheduled compliance audits are normally conducted soon after re-accreditation, and 6 months after re-accreditation if the arrangement operates for longer than six months of the accreditation year.

Auditor Training Course

- Audit Scheduling and Auditor Assignment (cont..)
  - Wherever possible, scheduled compliance audits are conducted when the arrangement is operating.
  - Where breaches of accreditation conditions are reported or suspected, investigatory audits are scheduled by the accrediting Authority (SIAQS).

Auditor Training Course

- Auditor Assignment
  - The auditor must have sufficient knowledge of the Operational Procedure, and the necessary skills and knowledge of their role and responsibilities as an Auditor to successfully complete audits.
  - When assigning auditors, the following factors should be considered:
  - Does the auditor have adequate experience and knowledge of the Operational Procedure?

Auditor Training Course

- Auditor Assignment (cont…)
  - Does the auditor have any required specialist qualifications or technical expertise (fumigation training) necessary to undertake audit activities relevant to the Operational Procedure?
  - Is the auditor independent of the auditee and are they free from bias or other influence?
  - An experienced Auditor will normally accompany an inexperienced auditor until they have achieved the required practical experience to effectively lead an audit. Auditors normally undertake audits independently once they have completed a set number of audits, or once their Manager is satisfied the auditor has sufficient experience in conducting an audit.

Auditor Training Course

- Planning and Preparation
  - Pre-Audit Contact with the Business
    - For all announced audits, auditors must advise the business of the impending audit and arrange a convenient time that suits the business and the auditor.

Auditor Training Course

- Planning and Preparation
  - Pre-Audit Preparation
    - A critical element of preparation for an audit is knowledge of the business, including the previous audit results and previous or outstanding Nonconformance Reports issued.
    - In preparation for an on-site audit, the auditor should review the auditor file and any previous audit reports, Nonconformance Reports and checklists (if applicable) and relevant Operational Procedures and draft an audit checklist.

Auditor Training Course

- Planning and Preparation (cont…)
  - Pre-Audit Preparation
    - The auditor needs to check whether changes to the operations of the business that may have occurred since the business was accredited. Such changes may include change of ownership or change of signatories.
    - Auditors must be aware of any outstanding Nonconformance Reports or rejection of product.

Auditor Training Course

- Planning and Preparation (cont…)
  - Drafting an Audit Checklist
    - In preparing for an on-site audit the auditor should prepare an *Audit Checklist*.
    - The audit checklist is a list of elements to be checked or steps to be taken in carrying out the audit. A checklist is used as a record of the information needed to enable you to confirm the system is in place and working.

Auditor Training Course

- Drafting an Audit Checklist
  - Audit Checklists are prepared to:
    - determine the understanding of staff as to their responsibilities and roles under the arrangement;
    - confirm that processes, calibration and operations meet the specified requirements of the operational procedure;
    - confirm that the required processes have been implemented and are operating in accordance with specified requirements of the operational procedure;
    - confirm that records and system documentation are maintained accurately.

Auditor Training Course

- Drafting an Audit Checklist
  - Reasons for using an Audit Checklists are:
    - help the auditor performing and preparing the audit;
    - provide objective evidence that the audit has been conducted,
      and that agreed aspects of the system were verified;
    - provide a memory jogger for the auditor;
    - provide historical data for future audits;

Auditor Training Course

- Drafting an Audit Checklist (cont…)
  - Reasons for using an Audit Checklists are:
    - allow the auditor to write notes during the audit;
    - provide material to assist the auditor for the exit meeting and the audit report; and
    - assist to develop sound audit skills.

Auditor Training Course

- Drafting an Audit Checklist (cont…)
  - Not all audits are the same and your approach to each audit may be different to meet different types of businesses and audit conditions.
    - In preparing a checklist you should strive for:
      - simplicity; and
      - objectivity

Auditor Training Course

- Drafting an Audit Checklist (cont…)
  - In establishing what information you need, try asking questions in an open style -
  - WHAT (What occurs, what equipment or records are involved)
  - WHO (Who does it, who takes it, who is accountable)
  - WHERE (What area, what location)
  - WHEN (What time, how often and when, other occasions)
  - HOW (How does this happen, how long etc.)
  - WHY (Why is this done)

Auditor Training Course

- EXERCISE ONE - PREPARING AUDIT CHECKLISTS
  - As an Auditor you will be required to prepare an audit checklist.
  - Your task in this exercise is to review the attached Operational Procedure and in your group prepare at least five (5) questions you would ask in the audit situation.

Auditor Training Course

- Performing the Audit
  - As previously outlined, the conduct of an on-site audit can be broken into four steps:
    - Entry Meeting
    - Audit
    - Co-ordination of results (caucus)
    - Exit Meeting

Auditor Training Course

- Performing the Audit
  - A question that is often asked is how long should an audit take. It is not possible to specify a minimum or maximum time that an audit should take due to the differing requirements of the Operational Procedures and the implementation in specific businesses. An audit should focus on obtaining sufficient objective evidence to make a decision as to whether the business is compliant with the requirements of the arrangement, rather than on the time taken.

Auditor Training Course

- Performing the Audit
  - The purpose of the Entry Meeting is to:
    - introduce the audit team;
    - summarise the scope and objectives of the audit;
    - provide an overview of the processes and activities to be undertaken during the audit;;
    - confirm that auditees, facilities, equipment, documents required by the audit team are available;
    - confirm and OH&S issues that need to be addressed before commencing the audit;
    - confirm the time for the Exit Meeting;

Auditor Training Course

- Performing the Audit
  - The Audit
    - This phase of the audit involves the auditor obtaining objective evidence through interviews with staff, observation of activities and examination of products, processes and records to verify the conformance (or nonconformance) of the business to the requirements of the arrangement.
    - The purpose of the audit is to confirm that the system is in place and ready to operate or operating in such a manner that the requirements of the relevant Operational Procedure will be/are being complied with.

Auditor Training Course

- Performing the Audit
  - In summary when performing audits:
    - auditors should use checklists as a guide;
    - auditors should seek and examine objective evidence by –
      - interview,
      - documents, forms and records,
      - observation of activities;
    - auditors should record specific details of the objective evidence that has been examined on the checklist;
    - auditors should determine whether the activity complies with the requirements of the Operational Procedure; and
    - auditors should accurately record the activity compliance on the checklist.

Auditor Training Course

- Performing the Audit
  - Collection of Audit Results (Caucus)
    - On completion of the audit, the auditor must decide whether to recommend accreditation, cancellation, suspension or amendment of the arrangement, issue Nonconformance Reports, negotiate corrective and preventive action to address any nonconformances, and determine whether a follow-up audit is required.
    - The audit caucus is an opportunity for the auditor(s) to check that all elements of the audit have been completed and that objective evidence for any nonconformance has been obtained.

Auditor Training Course

- Performing the Audit
  - The Exit Meeting is a brief meeting held at the completion of the audit to outline the audit findings.
    - At the Exit Meeting the auditor/s should:
      - present the audit observations;
      - detail any nonconformances and finalise any Nonconformance Reports;
      - discuss corrective and preventive action to address any nonconformances, including whether a follow-up audit is required;
      - summarise the audit findings and advise the auditee of the audit results.
  - It is always important at the Exit Meeting to lead with positive audit findings before presenting any nonconformances.

Auditor Training Course

Lesson Two

Nonconformances

Auditor Training Course

- Terms and Definitions
  - Nonconformance
  - Nonconformance Report

Auditor Training Course

- Nonconformances
  - Auditors will at audit identify where the requirements of an Operational Procedure have not been met.
  - Nonconformance of a business operating under an accreditation means the business has failed to fulfill the specified requirements of the Operational Procedure or their accreditation conditions.

Auditor Training Course

- Nonconformances
  - NCR's are issued to identify and record the nonconformance of a business and the corrective action and rectification. Note that serious and/or repeated nonconformances can lead to suspension and cancellation of a business' accreditation.
  - Similar to any decision during an audit, the identification of a nonconformance must be demonstrated by objective evidence collected by the auditor during the audit. **Nonconformance Reports must not be used where a nonconformance is suspected but has not been substantiated by the collection of objective evidence.**

Auditor Training Course

- Nonconformances
  - Critical Nonconformance
    - A critical nonconformance is a nonconformance which, (in the opinion of the auditor), significantly compromises the effectiveness of the accreditation and or will mean product certified under the arrangement does not comply with specified requirements.

Auditor Training Course

- Nonconformances
  - Examples of critical nonconformances are –
    - operating outside the scope of the Accreditation (i.e. certifying treatments when the Accreditation is cancelled or suspended);
    - failure to correctly treat product in accordance with the requirements of the Operational Procedure;
    - failure to permit entry of an Auditor to a premises for an audit or allowing the auditor to access records, documents equipment etc;
    - failure to allow an Auditor to interview employees;
    - intimidation, abuse or similar an Auditor.

Auditor Training Course

- Nonconformances
  - Major Nonconformance
    - A major nonconformance is a nonconformance where there is a breakdown in the system of treatment or other activity which compromises the assurance provided by the business's Accreditation, but where there is no evidence of a failure to comply with the specified quarantine requirements of the Operational Procedure.

Auditor Training Course

- Nonconformances
  - Examples of major nonconformances are –
    - failure to keep records of treatment;
    - failure to carry out calibration of treatment equipment;
    - permitting unauthorized personnel to issue Treatment Certificates.

Auditor Training Course

- Nonconformances
  - Minor Nonconformance
    - A minor nonconformance is a nonconformance, which threatens neither the effectiveness nor assurance provided by the Accreditation but is a nonconformance with the requirements of the operational procedure.
    - Minor nonconformances are essentially administrative or sometimes technical in nature.

Auditor Training Course

- Nonconformances
  - Minor Nonconformance (cont…)
    - Examples of minor nonconformances are –
      - failure to fully complete a treatment record;
      - failure to sign a treatment record.

Auditor Training Course

- Exercising Discretion on Nonconformances
  - As and auditor you will need to exercise some discretion in making a decision on the categorization of nonconformances. The definitions, guidelines and examples are provided to assist the auditor in making a decision on the categorization of a nonconformance.
  - The significance of the nonconformance will be affected by a number of issues and will, in specific instances, need to be considered when categorizing nonconformances.

Auditor Training Course

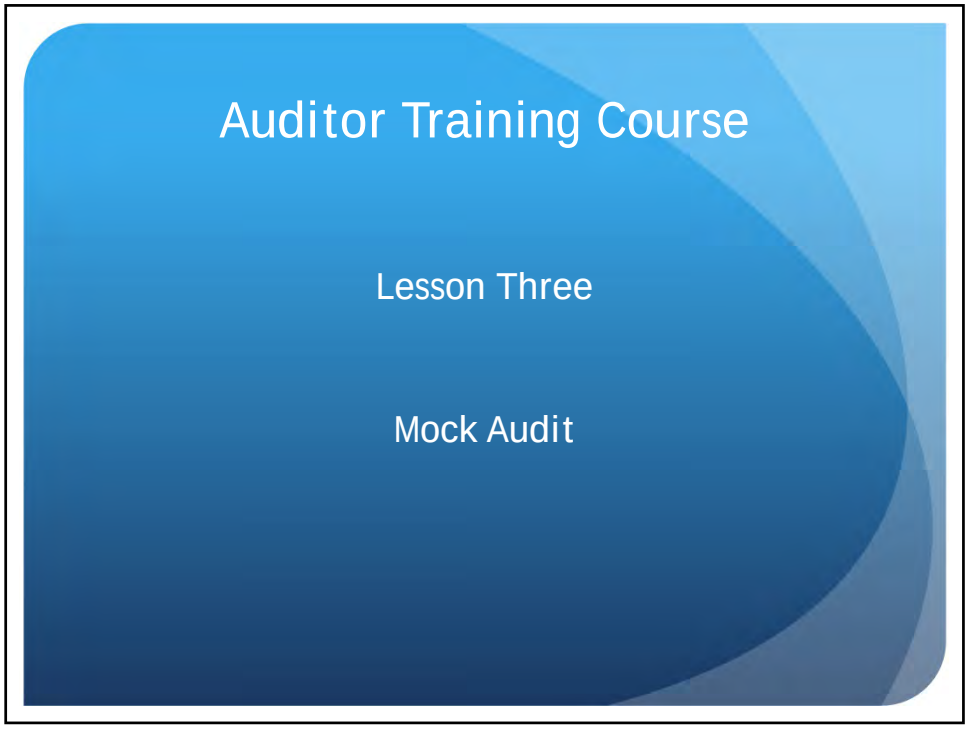
- Exercising Discretion on Nonconformances
  - The following issues are to be deliberated when making a decision on the categorization of a nonconformance –
    - whether the nonconformance was deliberate;
    - the quantity of product affected;
    - the disparity of the breach to the specified requirement (i.e. the variation of a fumigant concentration to the prescribed standard);
    - the frequency with which the nonconformance has occurred;
    - the potential or likely consequences of the nonconformance.

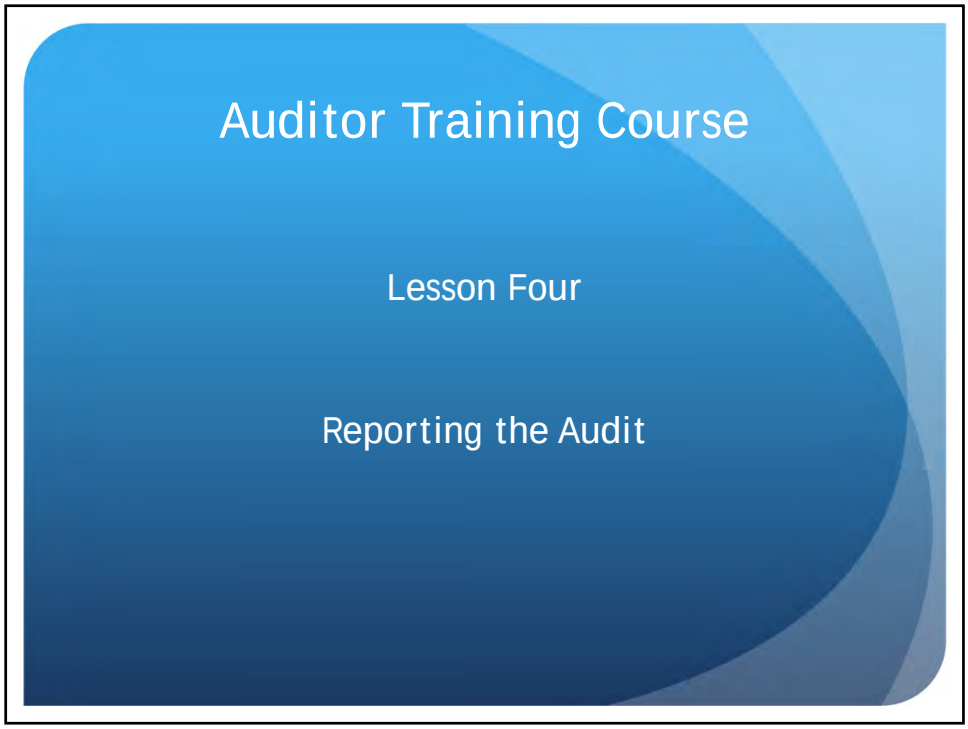
Auditor Training Course

- Exercising Discretion on Nonconformances (cont…)
  - When raising a NCR an auditor will need to consider whether a follow-up audit will be needed to close out the NCR. In most cases a subsequent audit visit will be required and an appropriate date should be negotiated with the business at the Exit Meeting.

Auditor Training Course

- EXERCISE TWO – HOW TO WRITE NON CONFORMANCE REPORTS
  - As an Auditor you will be required to write a report on your findings of the audit. As discussed there are two methods of reporting on the audit. The first is the Nonconformance Report and the second is the Audit Report.
  - Your task in this exercise is as follows -
    - Individually review the scenarios assigned to your group and identify the nonconformances.
    - Individually, complete Nonconformance Reports for each identified nonconformance. Nonconformances should be categorised as per previous guidelines.


Auditor Training Course
Lesson Three
Mock Audit


Auditor Training Course
Lesson Four
Reporting the Audit

Auditor Training Course

- Audit Report
  - An Audit Report is completed following each on-site audit. Audit reports must include the following information:
    - the name/s of the auditor/s;
    - the date and start and finish times of the audit;
    - the scope of the audit including –
      - the name of the auditee
      - the location of the audit
      - The Accreditation being audited

Auditor Training Course

- Audit Report (cont…)
  - An Audit Report is completed following each on-site audit. Audit reports must include the following information:
    - the type of audit;
    - a brief overview of the audit observations;
    - details of any Nonconformance Reports issued during the audit;
    - corrective and preventive action negotiated with the auditee to address any nonconformances and the time-frame for implementation; and
    - the auditor's judgment on whether accreditation or continued accreditation is recommended.

Auditor Training Course

- Audit Report (Cont…)
  - It is preferable that the draft Audit Report be completed on-site at the time of the audit and not left until the auditor returns to their office. The completion of the Audit Report on-site allows the auditor to make notes on the audit while it is current in their mind.
  - A copy of the Audit Report must be provided to the business within xx working days of completion of the audit. A copy of the Audit Report, any NCR's issued at the audit and completed Audit Checklist must be provided to the xx within ten working days of completion of the audit.
  - The Audit Report and attached NCR's (if any) and completed Audit Checklist are filed for the arrangement.

Auditor Training Course

- EXERCISE FOUR - HOW TO REPORT THE AUDIT
  - This exercise follows the Mock Audit Exercise. After completing the audit and identifying and reporting any nonconformances your next step is to write an Audit Report.
  - Your task in this exercise is as follows -
    - In your group discuss your findings on the mock audit and how you would report them on the Audit Report.
    - After deciding how to report the audit individually complete an Audit Report.

Auditor Training Course

- Follow Up Audit
  - At a follow-up audit the auditor checks that nonconformances noted in the original audit have been adequately corrected and that the business is now suitable for accreditation or reinstatement of accreditation. Only those requirements that were lacking need to be checked during a follow-up audit.
  - Follow-up audits should only be undertaken once the accredited business has advised that a required corrective and preventive action(s) have been implemented to address and close-out the nonconformance(s).

Auditor Training Course

- Follow Up Audit (cont…)
  - Where corrective and preventive action has not been implemented within agreed time frames, accreditation may need to be suspended until such time as the follow-up audit has been successfully completed and the Nonconformance Report closed-out.

Auditor Training Course

- On-Going Surveillance and Monitoring
  - After an arrangement has been accredited, routine monitoring and surveillance will be undertaken to verify continued effective operation of the arrangement. The business may be monitored by scheduled and unscheduled compliance audits, investigatory audits and surveillance.

Auditor Training Course

- Module Three Summary
  - What did we discuss?
    - What is an Audit?
    - Stages of an Audit
    - The On-Site Audit Process
    - Audit Schedule and Auditor Assignment
    - Planning and Preparation
    - Performing the Audit

Auditor Training Course

- Module Three Summary (cont…)
  - What did we discuss?
    - Terms and definitions
    - Nonconformances
    - Categories of Nonconformances
    - Exercising Discretion on Nonconformances
    - Audit Reporting
    - Follow Up Audits
    - On-going Surveillance and Monitoing

Auditor Training Course

Module Four

Accrediting Individuals and Businesses

Auditor Training Course

- Module Aims
  - The aim of this module is to give you an understanding on how to grant, cancel and suspend an accreditation

Auditor Training Course

- Lesson Topics
  - Lesson One – Granting, Cancelling and Suspending an Accreditation
    - Accrediting an Arrangement
    - Cancellation and Suspension of an Arrangement

Auditor Training Course

- Lesson One – Granting, Cancelling and Suspending an Accreditation

Auditor Training Course

- Granting, Cancelling and Suspending an Accreditation
  - After completing a desk audit or on-site audit, the auditor must make a decision as to recommend accreditation or to recommend cancellation or suspension of the arrangement.
  - To make this decision all auditors must be aware of the correct procedures for dealing with accreditation under the Accreditation Scheme.

Auditor Training Course

- Granting, Cancelling and Suspending an Accreditation
  - Accrediting and Arrangement
    - Auditors are generally not solely responsible for granting or refusing an accreditation. Auditors are responsible for confirming the compliance of an accreditation to specified requirements. Based on the result of an audit, an auditor will recommend (or not recommend) the accreditation of a business.
    - The responsibility for granting, cancelling or suspending an accreditation rests with the person or persons who have been delegated that responsibility. This is generally the CEO or higher-level managers within a quarantine authority.

Auditor Training Course

- Granting, Cancelling and Suspending an Accreditation (cont…)
  - Accrediting and Arrangement
    - Auditors will need to use discretion and have a valid reason for recommending the granting or refusal of an accreditation. In reaching a decision, auditors must weigh up the rights of the applicant with the need to ensure the effectiveness of an arrangement and the integrity of the SIAQS certification.

Auditor Training Course

- Granting, Cancelling and Suspending an Accreditation (cont…)
  - Accreditation Process
    - The following steps will normally apply to accreditations granted under the Accreditation Scheme –
      - Application for Accreditation;
      - Desktop Audit;
      - Initial Audit;
      - Compliance Audit (2 annually)

      2nd Year
      - Application for Re-accreditation;
      - Desktop Review;
      - Re-Accreditation;
      - Compliance Audit (2 annually)

Auditor Training Course

- Granting, Cancelling and Suspending an Accreditation (cont…)
  - Accreditation Process
    - The following steps will normally apply to accreditations granted under the Accreditation Scheme –
      - **3rd Year (and so on)**
      - Application for Re-accreditation;
      - Desktop Review;
      - Re-Accreditation;
      - Compliance Audit (2 annually)

Auditor Training Course

- Granting, Cancelling and Suspending an Accreditation (cont…)
  - **Factors to be Considered When Granting or Refusing an Accreditation**
    - applicant's knowledge and ability to comply with the Operational Procedure;
    - staff understanding of the Accreditation system and their individual responsibilities and duties; and
    - whether the system has been implemented to ensure that the business functions in accordance with the Operational Procedure.

Auditor Training Course

- Granting, Cancelling and Suspending an Accreditation (cont…)
  - **Factors to be Considered When Granting or Refusing an Accreditation**
    - The person (usually the CEO or higher level managers within the quarantine authority) granting the accreditation must be satisfied that all accreditation conditions have been met and the system implemented by the business meets the requirements of the Operational Procedure covering the Accreditation.

Auditor Training Course

- Granting, Cancelling and Suspending an Accreditation
  - Granting Initial Accreditation
    - Following receipt of an Application for Accreditation and an audit report recommending accreditation, the delegate responsible, if satisfied that the accreditation conditions have been met, will normally grant accreditation.

Auditor Training Course

- Granting, Cancelling and Suspending an Accreditation
  - Accreditation
    - If as the result of an initial audit, accreditation is recommended then the business will be audited twice annually.

Auditor Training Course

- Granting, Cancelling and Suspending an Accreditation
  - Re-accreditation
    - A business will normally be re-accredited on receipt of an Application for Accreditation for renewal of the Accreditation in years subsequent to the initial accreditation. Re-accreditation is provisional on no outstanding nonconformances against the business which would prevent re-accreditation.

Auditor Training Course

- Granting, Cancelling and Suspending an Accreditation (cont…)
  - Re-accreditation
    - In certain circumstances, the delegate may not grant re-accreditation until a satisfactory compliance audit has been conducted. These circumstances may include:
      - an accreditation has outstanding nonconformances (usually major or critical) that must be closed prior to re-accreditation;
      - an arrangement which has lapsed and the business is wanting reaccreditation;
      - an arrangement where key staff or equipment has changed significantly since the previous compliance audit.

- Granting, Cancelling and Suspending an Accreditation (cont…)
  - Suspension or Cancellation
    - An auditor will face circumstances where it is necessary to recommend canceling or suspend an accreditation. Whilst it is not possible to outline all the circumstances under which such action may become necessary some guidance for such action is provided below.

- Granting, Cancelling and Suspending an Accreditation (cont…)
  - Suspension or Cancellation
    - Failure to comply with the Operational Procedure will breach the accreditation conditions and will therefore be grounds for suspension or cancellation of an accreditation. Another may be failure of an accredited business to give access to facilities or staff or to pay fees (if applicable).

Auditor Training Course

- Granting, Cancelling and Suspending an Accreditation (cont…)
  - Factors to be Considered When Cancelling or Suspending an Accreditation
    - Cancelling or suspending an accreditation may cause significant financial loss to a business. It should be noted however that failure of a business to comply with the conditions of accreditation may compromise the integrity of the issuing country's phytosanitary certificates.

Auditor Training Course

- Granting, Cancelling and Suspending an Accreditation (cont…)
  - Factors to be Considered When Cancelling or Suspending an Accreditation
    - Remember, immediate suspension should only be exercised where a failure to suspend would compromise the effectiveness of the scheme or the confidence of an overseas authority.
    - The auditor should refer a recommendation to immediately suspend a business to the appropriate delegate.

Auditor Training Course

- EXERCISE ONE – WHEN TO SUSPEND, CANCEL &/OR AMEND
  - **Instruction**
    - As an Auditor you will be required to recommend the suspension or cancellation of an Accreditation.
    - Your task in this exercise is as follows -
      - Individually review the scenarios assigned to your group and decide what recommendations you would make.

Auditor Training Course

- Module Four Summary
  - What did we discuss?
    - Accrediting an Arrangement
    - Cancelling and Suspension of an Arrangement


End

ASSESSEE'S DETAILS

Full Name (Mr/Mrs/M/s): _____

Company Name: _____

Job/Position Title: _____

Workplace Address: _____

Postal Address: _____

Telephone No.: _____

E-mail Address: _____

Place of Assessment: _____

Date of Assessment: _____

ASSESSMENT INFORMATION

This is Part One of the assessment for the Auditor Training Course. This assessment task will involve you undertaking the attached written exam.

The written exam involves completing a number of short answer questions, on the material in each lesson and module of the course. This task is open book and designed to reinforce the learning process.

ASSESSMENT STANDARDS

You must meet the following to successfully complete the assessment:

- attempt all the questions; and
- correctly answer 80% of the questions.

You will be permitted three attempts at each assessment task. If you don't complete the assessment successfully after three attempts you will require further training before re-assessment.

ASSESSMENT FEEDBACK

If requested, feedback will be given to you from the assessor after the assessment has been completed and marked. You will also be given the opportunity to give the assessor feedback at this time.

APPLICABLE RESOURCES

The following resources are applicable to this assessment. You should make yourself familiar with these resources prior to undertaking this assessment.

- Auditor Training Course – Participants Notes.

QUESTION SHEET

MODULE ONE –BACKGROUND TO QUALITY AND QUALITY MANAGEMENT AND THE FUMIGATION ACCREDITATION SCHEME

LESSON ONE – INTRODUCTION TO QUALITY ASSURANCE

1). Explain the following terms

Quality _____

_____

Quality Assurance _____

_____

Quality Management _____

_____

Nonconformance _____

_____

2). What is HACCP?

_____

_____

_____

_____

LESSON TWO – INTRODUCTION TO THE FUMIGATION ACCREDITATION SCHEME

3). What are the differences between the Fumigation Accreditation Scheme and supervision of treatments?

_____

_____

_____

4). What are three benefits for government in implementing the Fumigation Accreditation Scheme?

_____

_____

_____

LESSON THREE – STRUCTURE OF THE FUMIGATION ACCREDITATION SCHEME

5). What does the Operational Procedure – Fumigation with Methyl Bromide detail?

_____

_____

_____

_____

_____

MODULE TWO –INTRODUCTION TO AUDITING

LESSON ONE – PURPOSE AND TYPE OF AUDITS

6). Explain the following terms

Announced Audit _____

_____

Audit_____

_____

Auditor _____

_____

Desk Auditor _____

_____

On-site Auditor_____

_____

7). Name four (4) purposes of an audit?

_____

_____

_____

_____

8). What are the three levels or classifications of auditing?

_____

_____

_____

9). What are the four types of on-site auditing?

_____

_____

10). What type of audits can be unannounced?

_____

_____

11). What type of audits would you close out an NCR?

_____

_____

_____

LESSON TWO – UNDERSTANDING THE OPERATIONAL PROCEDURE – FUMIGATION WITH METHYL BROMIDE

12). What are the elements of an Operational Procedure?

_____

_____

_____

_____

_____

13). Why do auditors need to be familiar with the Operational Procedure before audit?

_____

_____

_____

LESSON THREE – COLLECTING DATA, AUDITING TECHNIQUES AND TOOLS

14). What are the two types of data?

_____

_____

_____

15). As an auditor, what is the recommended number of treatment records you would audit if the business had completed 150 treatment records since the last audit?

_____

_____

_____

16). What are the three methods of gathering information (data) on which to base decisions?

_____

_____

_____

17). Name the different Question Types?

_____

_____

_____

18). Name five different types of poor listening habits?

_____

_____

_____

19). Name four effective listening habits?

_____

_____

_____

LESSON FOUR – ROLES AND RESPONSIBILITIES OF AUDITORS

20). What are auditors responsible for under the Accreditation Scheme?

_____

_____

_____

_____

21). List five desirable attributes an auditor should have?

_____

_____

_____

22). List five undesirable attributes an auditor shouldn't have?

_____

_____

_____

23). What are the potential problems in the contact between auditor and auditee?

_____

_____

_____

24). List the different auditor and auditee types ?

_____

_____

_____

MODULE THREE –CONDUCTING AN AUDIT

LESSON ONE – THE ON-SITE AUDIT

25). Of the total time spent on an audit, what percentage is considered ideal to spend on planning and preparation?

_____

_____

_____

26). What factors should be considered when assigning an auditor?

_____

_____

_____

27). Why are audit checklists prepared?

_____

_____

_____

28). What is the purpose of an Entry Meeting?

_____

_____

_____

_____

_____

29). What is the purpose of a Caucus during an audit?

_____

_____

_____

30). What is the purpose of an Exit Meeting?

_____

_____

_____

LESSON TWO – NONCONFORMANCES

31). Explain the following terms

Nonconformance _____

_____

Nonconformance Report _____

_____

32). What are the three categories of nonconformance?

_____

_____

_____

33). Provide three examples of a critical nonconformance?

_____

_____

_____

34). Provide three examples of a major nonconformance?

_____

_____

_____

35). What issues need to be deliberated when making a decision relating to the categorisation of a nonconformance?

_____

_____

_____

LESSON FOUR – REPORTING THE AUDIT

36). What information must be recorded on an Audit Report?

_____

_____

_____

_____

_____

_____

37). When should an Audit Report be completed?

_____

_____

_____

_____

MODULE FOUR –ACCREDITING INDIVIDUALS AND BUSINESSES

LESSON ONE – GRANTING, CANCELLING AND SUSPENDING AN ACCREDITATION

38). What factors should be considered when granting or refusing an accreditation?

_____

_____

_____

_____

39). What factors should be considered when suspending an accreditation?

_____

_____

_____

_____

40). Who would normally grant, refuse or suspend an accreditation?

_____

_____

_____

ASSESSMENT OUTCOME

Did the assessee achieve the requirements of this assessment?

Yes No

Assessor Name: _____

Assessors Signature: _____

Assessors Verification

In signing below the assessor named above confirms that the assessment was conducted according to the criteria specified in this assessment tool.

Assessor Signature: _____

CONTEXT OF ASSESSMENT

Include any factors such as mitigating circumstances or incidences that occurred prior to or during the assessee undertaking this assessment that may have affected the performance of the assessee.

COMMENTS

_____

_____

_____

_____

_____

RECORDING

The outcome of this assessment and the assessee's details have been recorded

Date recorded: _____/_____ / _____

Recorded by: _____

	Solomon Islands Government *MINISTRY OF AGRICULTURE & LIVESTOCK* *PO BOX G13, Hibiscus Avenue, Honiara, Solomon Islands*	***Business Application Form***

1. Indicate the type of application being made (please tick box)

□ New ☑ Renewal □ Amendment

Approved Businesses wishing to conduct quarantine fumigation treatments are to complete and submit an Approved Business Application Form to the SIAQS at the beginning of each calendar year.

Date of Application: 15/1/13

Approved Business Name	EXPERT PEST CONTROL C°
Approved Business Address	SECOND ST HONIARA SOLOMON ISLANDS
Facility Address (if different from Approved Business Address)	7 WHARF ST HONIARA
Telephone	123 456
Mobile	
Operation	☑ Sheet Fumigation □ Container Fumigation □ Stack Fumigation

2. Approved Fumigators (for Fumigation Treatment Certificates)

Family name	Given Name(s)	Specimen Signature
SMITH	ROBERT	

3. Approved Business Conditions

a. The Approved Business must perform fumigations in accordance with the SIAQS Operational Procedure 'Fumigation with Methyl Bromide' and must maintain records specified in Section 9 of the Operational Procedure.

b. The Approved Business will, upon request, allow an Inspector of the SIAQS to enter the Business or facility where a fumigation is being undertaken.

c. The Approved Business must take all steps to assist an inspector in the conduct of audits including allowing the Inspector or Officer of the SIAQS to interview any employee of the Approved Business in relation to the implementation of the Operational Procedure.

d. The Approved Business authorizes the persons listed in Section 2 of this application to issue Fumigation Treatment Certificates on his or her behalf.

4. You agree that all the information contained in this form is true and correct.

Signature	Date
	15/1/13

Office Use Only

Date Received	SIAQS Officer Approval	Director of SIAQS Approval
15/1/13	Yes/No	Yes/No
	Signature of SIAQS Officer	Signature of Director of SIAQS

Attachment 1

Fumigation Record No 1

Job Details

Customer Name	Start Date of Fumigation	Location
A MART	1/2/13	WHARF

Description of Consignment: SAWN TIMBER 21 Tonne

Target of Fumigation	Container Numbers / Consignment Identification
TIMBER	GSTU 176 2764

Fumigation Details

Adequate free airspace, no impervious surfaces or wrapping, maximum timber thickness & spacing ☐ Yes ☐ No

☐ Sheeted Container — Size: — Qty:

☐ Sheeted Stack

☑ Pressure Tested Container — Decay Time = 11 seconds

☐ Chamber

Enclosure Dimensions: L 6m H 2.6 W 2.4m

Volume = 37.44 m^3

Specified Dose Rate	Exposure Period	Forecast Minimum Temp	Dosage Rate Used
48 g/m^3	24 hrs	23°C	48 g/m^3

Calculated Dose	Chloropicrin	Actual Dosage Applied	Time dosing finished
1.8 Kg	☑ N/A	1.8 Kg	8:00 am

Concentration Readings

Phase	Time of reading	Standard g/m^3	Monitor Line Readings by Location 1	2	3	4	5	Equilibrium Calculation	Top-up Dose
Start	8:20	36	47	47	47	/	/	/ %	
								%	
During									
End	8:20	16.8	22	22	22				

Comments: Passed OK

Ventilation

Initial TLV (ppm)	Date & Time Taken	2nd TLV Reading (ppm	Date & Time Taken
5	2/2/13 9am		

Approved Fumigator		Quarantine Officer (if supervised)	
Name: ROBERT SMITH	Signature: [signature]	Name	Signature

Attachment 1

Fumigation Record No 2

Job Details

Customer Name	Start Date of Fumigation	Location
C. SMITH	2/2/13	OCEAN VIEW RD

Description of Consignment: PERSONAL EFFECTS

Target of Fumigation	Container Numbers / Consignment Identification
GAS	TRLU 1666522

Fumigation Details

Adequate free airspace, no impervious surfaces or wrapping, maximum timber thickness & spacing ☐ Yes ☐ No

☑ Sheeted Container ☐ Sheeted Stack

Size: Qty:

☐ Pressure Tested Container ☐ Chamber

Decay Time = seconds

Enclosure Dimensions: L 12.2 H 2.9 W 2.4

Volume = 76.1 m^3

Specified Dose Rate	Exposure Period	Forecast Minimum Temp	Dosage Rate Used
128 g/m^3	24 hrs	21°C	128 g/m^3

Calculated Dose	Chloropicrin	Actual Dosage Applied	Time dosing finished
9.74 kg	☑ N/A	9.8 kg	8:20 am

Concentration Readings

Phase	Time of reading	Standard g/m^3	Monitor Line Readings by Location 1	2	3	4	5	Equilibrium Calculation	Top-up Dose
Start	9:00	96	120	119	120	/	/	1 %	
								%	
During									
End	9:00	24	26	25	26				

Comments: OK Passed

Ventilation

Initial TLV (ppm)	Date & Time Taken	2nd TLV Reading (ppm)	Date & Time Taken
5	1000 am		

Approved Fumigator		Quarantine Officer (if supervised)	
Name	Signature	Name	Signature
ROBERT SMITH			

Attachment 1

Fumigation Record No 3

Job Details

Customer Name	Start Date of Fumigation	Location
BILLS FURNITURE	2/2/13	MAIN WHARF

Description of Consignment: SAWN TIMBER

Target of Fumigation: TIMBER PESTS

Container Numbers / Consignment Identification: CLXU 1234567 / CLXU 8887777

Fumigation Details

Adequate free airspace, no impervious surfaces or wrapping, maximum timber thickness & spacing ☐ Yes ☐ No

☑ Sheeted Container ☐ Sheeted Stack

Size: Qty:

☐ Pressure Tested Container ☐ Chamber

Decay Time = seconds

Enclosure Dimensions: L 12.2 H 2.9 W 2.4

Volume: = (76.1) x 2 m^3

Specified Dose Rate	Exposure Period	Forecast Minimum Temp	Dosage Rate Used
48g	24 hrs	21°C	48 g/m^3

Calculated Dose	Chloropicrin ☐ N/A	Actual Dosage Applied	Time dosing finished
3.65 kg		3.8 kg	8:00am

Concentration Readings

Phase	Time of reading	Standard g/m^3	Monitor Line Readings by Location 1	2	3	4	5	Equilibrium Calculation	Top-up Dose
Start	9:00	55.6	48	48	45			6.6 %	
								%	
During									
End	9:00	14.4	48	48	45				

Comments: ok

Ventilation

Initial TLV (ppm)	Date & Time Taken	2nd TLV Reading (ppm)	Date & Time Taken
5	3/2/13 9:00 am		

Approved Fumigator		Quarantine Officer (if supervised)	
Name	Signature	Name	Signature
G. JONES	G. Jones.		

Attachment 1

Fumigation Record No 4

Job Details

Customer Name	Start Date of Fumigation	Location
ACE TIMBER	6/2/13	WHARF

Description of Consignment: TIMBER

Target of Fumigation	Container Numbers / Consignment Identification
TIMBER PESTS	GSTU 9988771

Fumigation Details

Adequate free airspace, no impervious surfaces or wrapping, maximum timber thickness & spacing ☑ Yes ☐ No

☐ Sheeted Container — Size: — Qty:

☐ Sheeted Stack

☑ Pressure Tested Container — Decay Time = 25 seconds

☐ Chamber

Enclosure Dimensions: L 6 H 2.6 W 2.4

Volume = 37 m^3

Specified Dose Rate	Exposure Period	Forecast Minimum Temp	Dosage Rate Used
48g	24 hrs	22° C	48 g/m^3

Calculated Dose	Chloropicrin	Actual Dosage Applied	Time dosing finished
1.776 kg	☑ N/A	2.0 kg	8:45am

Concentration Readings

Phase	Time of reading	Standard g/m^3	Monitor Line Readings by Location 1	2	3	4	5	Equilibrium Calculation	Top-up Dose
Start	9:05am	36 g/m^3	42	42	40			5%	
								%	
During									
End	10:00	14.4	22	18	17				

Comments: OK

Ventilation

Initial TLV (ppm)	Date & Time Taken	2nd TLV Reading (ppm	Date & Time Taken
27	11:07	4	12:50pm

Approved Fumigator		Quarantine Officer (if supervised)	
Name: ROBERT SMITH	Signature:	Name	Signature

Attachment 1

Fumigation Record No 5

Job Details

Customer Name	Start Date of Fumigation	Location
TIMBER WHOLESALERS	22/1/13	WHARF

Description of Consignment: SAWN TIMBER

Target of Fumigation	Container Numbers / Consignment Identification
TIMBER GAS	TTNU 274 1379

Fumigation Details

Adequate free airspace, no impervious surfaces or wrapping, maximum timber thickness & spacing ☑ Yes ☐ No

☐ Sheeted Container ☐ Sheeted Stack

Size: Qty:

☑ Pressure Tested Container ☐ Chamber

Decay Time = seconds

Enclosure Dimensions: L 6 H 2.6 W 2.4

Volume = 37 m^3

Specified Dose Rate	Exposure Period	Forecast Minimum Temp	Dosage Rate Used
128 g/m^3	24 hrs	22°C	128 g/m^3

Calculated Dose	Chloropicrin ☐ N/A	Actual Dosage Applied	Time dosing finished
4.736 kg		4.736 kg	3:00 pm

Concentration Readings

Phase	Time of reading	Standard g/m^3	Monitor Line Readings by Location 1	2	3	4	5	Equilibrium Calculation	Top-up Dose
Start	3:50pm	96	96	96	96			— %	
								%	
During									
End	350pm	38.4	39	39	39				

Comments: ok

Ventilation

Initial TLV (ppm)	Date & Time Taken	2nd TLV Reading (ppm)	Date & Time Taken
0 ppm	355pm		

Approved Fumigator		Quarantine Officer (if supervised)	
Name R. SMITH	Signature	Name	Signature

You Gas Em

[Street Address], [City], [State] [Postal Code]

Invoice No.:

Customer ID: Expert pest Control Company

Bill To:

Expert Pest Control Company
Honiara

Ship To:

Expert Pest Control Company
Honiara

Date	Order No.	Sales Rep.	FOB	Ship Via	Terms	Tax ID
21/1/12						

Quantity	Item	Description	Discount	Taxable	Unit Price	Total
200 kg		Methyl Bromide				2$AUD 1500

Subtotal:	
Tax:	
Shipping:	
Miscellaneous:	
Balance Due:	$1500

Invoice

PHONE
[Your Phone]

FAX
[Your Fax]

WEB
[Web Address]

ABC Calibration Company

Certificate of Calibration

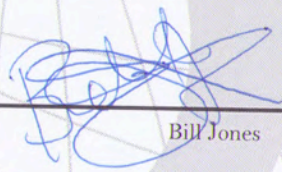
Fumiscope Serial No 777

Calibrated on 1/2/13 Due Date 1/2/14

Expert Pest Control Company

Technician

Bill Jones



Bill Jones

Methyl Bromide Log -
Expert Pest Control Company
Second Street, Honiara, Solomon Islands

Date	Job No	Amount Used	Amount Remaining	Signed
21/1/13	—	~~200~~	200kg	
22/1/13	766	4.8kg	195.2kg	
2/2/13	791	3.8kg	191.4kg	
6/2/13	815	2.0kg	189.4kg	
13/2/13	829	4.4kg	185.0kg	
15/2/13	845	2.0kg	183.0kg	

	Solomon Islands Government *MINISTRY OF AGRICULTURE & LIVESTOCK* *PO BOX G13, Hibiscus Avenue, Honiara, Solomon Islands*	***FILE NOTE SHEET***

Business Name	
Contact Name	
Telephone	

Date	Officer	Comment/Action

	Solomon Islands Government *MINISTRY OF AGRICULTURE & LIVESTOCK* *PO BOX G13, Hibiscus Avenue, Honiara, Solomon Islands*	***Audit Report***

Business Name			
Contact Name			
Telephone		Audit Number	

Audit Date	/ /	Start Time		Finish Time	
Auditor(s)					
NCR Number(s)					

AUDIT SUMMARY

Accreditation (tick applicable box)	**Recommended** ☐	**Not Recommended** ☐
Auditor Name	**Signature**	**Date**

	Solomon Islands Government *MINISTRY OF AGRICULTURE & LIVESTOCK* *PO BOX G13, Hibiscus Avenue, Honiara, Solomon Islands*	***AUDIT AGENDA***

Business Name			
Contact Name			
Telephone		Audit Number	

ENTRY MEETING

☐ Introduce Audit Team

☐ Complete Attendance Sheet

☐ Explain Audit (Purpose and Scope)

☐ Explain On-Site Audit Itinerary (Entry Meeting, Audit, Caucus and Exit Meeting)

☐ Familiarisation Tour (if required)

Additional Comments

EXIT MEETING

☐ Complete Attendance Sheet

☐ Present Audit Report. Issue NCR's

☐ Thank the Business/Auditee(s)

Additional Comments

	Solomon Islands Government *MINISTRY OF AGRICULTURE & LIVESTOCK* *PO BOX G13, Hibiscus Avenue, Honiara, Solomon Islands*	***AUDIT ATTENDANCE SHEET***

Business Name			
Contact Name			
Telephone		Audit Number	

ENTRY MEETING

Audit Date	/ /	Start Time		Finish Time	

NAME	POSITION	SIGNATURE

EXIT MEETING

Audit Date	/ /	Start Time		Finish Time	

NAME	POSITION	SIGNATURE

	Solomon Islands Government *MINISTRY OF AGRICULTURE & LIVESTOCK* *PO BOX G13, Hibiscus Avenue, Honiara, Solomon Islands*	***NONCONFORMANCE REPORT (Original)***

Business Name			
Contact Name			
Telephone		Audit Number	
NCR Number			

NONCONFORMANCE DETAILS

Procedure Reference	Section(s)
Description of Nonconformity	
Classification ☐ Critical ☐ Major ☐ Minor	

Nonconformity Acknowledgement (Business to complete)

Name	Position	
Signature	Date	
	/ /	
Proposed Follow-Up Date	/ /	
Auditor Name	Signature	Date
		/ /

Follow-Up & Close Out Details

Follow-Up Audit Date	/ /		
Details			
Nonconformance Report Closed	☐ Yes ☐ No ➔	If no, new NCR number	
Auditor Name	Signature		Date
			/ /

	Solomon Islands Government *MINISTRY OF AGRICULTURE & LIVESTOCK* *PO BOX G13, Hibiscus Avenue, Honiara, Solomon Islands*	***Audit Checklist***

Business:			**Audit date:**		**Audit No:**
No	**Position/Person**	**Requirement**	**Procedure reference**	**Compliance Yes/No**	**Comments/Remarks**
	Position: Name:	…… …… …… …… ……			…… …… …… …… ……
	Position: Name:	…… …… …… …… …… ……			…… …… …… …… …… ……

	Solomon Islands Government *MINISTRY OF AGRICULTURE & LIVESTOCK* *PO BOX G13, Hibiscus Avenue, Honiara, Solomon Islands*	***Business Application Form***

1. Indicate the type of application being made (please tick box)

□ New □ Renewal □ Amendment

Approved Businesses wishing to conduct quarantine fumigation treatments are to complete and submit an Approved Business Application Form to the SIAQS at the beginning of each calendar year.

Date of Application: _____

Approved Business Name	
Approved Business Address	
Facility Address (if different from Approved Business Address)	
Telephone	
Mobile	
Operation	□ Sheet Fumigation □ Container Fumigation □ Stack Fumigation

2. Approved Fumigators (for Fumigation Treatment Certificates)

Family name	Given Name(s)	Specimen Signature

3. Approved Business Conditions

a. The Approved Business must perform fumigations in accordance with the SIAQS Operational Procedure 'Fumigation with Methyl Bromide' and must maintain records specified in Section 9 of the Operational Procedure.
b. The Approved Business will, upon request, allow an Inspector of the SIAQS to enter the Business or facility where a fumigation is being undertaken.
c. The Approved Business must take all steps to assist an inspector in the conduct of audits including allowing the Inspector or Officer of the SIAQS to interview any employee of the Approved Business in relation to the implementation of the Operational Procedure.
d. The Approved Business authorizes the persons listed in Section 2 of this application to issue Fumigation Treatment Certificates on his or her behalf.

4. You agree that all the information contained in this form is true and correct.

Signature	Date

Office Use Only

Date Received		**SIAQS Officer Approval**		**Director of SIAQS Approval**
___/_____/____		Yes/No		Yes/No
		Signature of SIAQS Officer		**Signature of Director of SIAQS**

Business:			**Audit date:**		
No.	**Reference**	**Requirement**	**Document reference**	**Compliance Yes/No**	**Comments/Remarks**
1.		**What are the Responsibilities of the Business Principal and Approved Fumigator?** The Business Principal (or delegate) is responsible for - • training staff in their responsibilities and duties under this Operational Procedure; • ensuring the Approved Fumigator complies with their responsibilities under this Procedure; • ensuring that all fumigation treatments are carried out in accordance with this Operational Procedure; • ensuring all fumigations are performed by an Approved Fumigator; • ensuring the gas monitoring device and detector are calibrated; and • if applicable, ensuring weighing scales are calibrated at least every 6 months. The Approved Fumigator is responsible for - • ensuring that all fumigation treatments are carried out in accordance with this Operational Procedure; • maintaining the fumigation equipment; • determining the rate and dosage of fumigant required for each fumigation; • if applicable, maintaining weighing scale calibration records; • maintaining fumigation treatment records; and • ensuring fumigation treatments comply with local government, environmental and workplace health	5		

Business:			Audit date:		
No.	**Reference**	**Requirement**	**Document reference**	**Compliance Yes/No**	**Comments/Remarks**
		and safety authorities.			
2.		**What are the dosage requirements?** Fumigation with methyl bromide by an Approved Fumigator at a rate that conforms to the entry requirements of the destination country.	6		
3.		**What are the temperature requirements when fumigating?** The Approved Fumigator shall ensure fumigations are not carried out if the ambient minimum temperature falls below 10° C. The Approved Fumigator shall also ensure the fumigant dosage is compensated for ambient temperatures below 21° C. The Approved Fumigator shall ensure for each 5°C (or part of 5°C) the temperature is expected to fall below 21 °C, 8g/m^3 is added to the dosage, unless otherwise specified by the importing country.	6.2		
4.		**What are the fumigation site requirements?** The fumigation site used to conduct methyl bromide fumigation treatments under this procedure must – • have a surface impermeable to the fumigant when the fumigation is carried out under gas proof sheets; • be able to be segregated to minimize any OH&S risks ; • be well ventilated; and • have a reliable power supply available. When the site surface is porous or otherwise unsuitable for conducting a fumigation under gas proof sheets, the Approved Fumigator shall use a floor sheet. Unsuitable	7.1		

Business:			Audit date:		
No.	**Reference**	**Requirement**	**Document reference**	**Compliance Yes/No**	**Comments/Remarks**
		surfaces include soil (including cement consolidated soil), sand, base rock and pavers.			
5.		**What are the fumigation site risk assessment requirements?** The Approved Fumigator shall perform a risk assessment of the fumigation site prior to undertaking a fumigation. The Approved Fumigator shall ensure - • the fumigation site can be secured from unauthorized entry; • the fumigation site is sufficient distance from occupied building and public areas; • the fumigant can be applied and vented safely; and • emergency procedures at the site are in place. The Approved Fumigator shall establish a risk area to a minimum of 3 metres around the fumigation enclosure if outdoors and a minimum of 6 metres around the fumigation enclosure if indoors.	7.2		
6.		**What are the fumigation site safety signage requirements?** The Approved Fumigator shall ensure signage is placed outside the immediate fumigation area as a warning that a fumigation is being undertaken and the signage will remain there from the time the gas is ready to be applied until the enclosure has been ventilated below the TLV. The signage (minimum A4 size paper) will consist of the following details: • Skull and crossbones icon	7.2		

Business:			Audit date:		
No.	**Reference**	**Requirement**	**Document reference**	**Compliance Yes/No**	**Comments/Remarks**
		• The wording 'Danger – Methyl Bromide Fumigation in Progress' • The dosage rate and duration • Time and date the fumigation commenced • Time and date the fumigation is complete • Fumigator name • Container number(s) (if applicable)			
7.		**What are the pressure test requirements for un-sheeted containers?** The Approved Fumigator shall pressure test all un-sheeted containers used for methyl bromide fumigation treatments. A pressure test decay time from 200 to 100 Pa of 10 seconds or more must be achieved to certify that the container is gas-tight. The Approved Fumigator shall record the gas pressure test details on the Fumigation Record (Attachment 1) and undertake the gas pressure test in accordance with the following - • Using a finger manifold and pressure gauge (or similar devices), raise the pressure within the container to 250 Pa and then turn off the compressed air supply. The Fumigator must ensure the pressure within the container is not raised to a pressure that may cause damage to the container seals or ventilators. • The Fumigator must wait until the pressure within the chamber decays to 200 Pa and then record the time taken for the pressure to decay from 200Pa to 100 Pa. This time must be recorded on the	7.3		

Business:			Audit date:		
No.	**Reference**	**Requirement**	**Document reference**	**Compliance Yes/No**	**Comments/Remarks**
		Fumigation Record. • The pressure decay time between 200 Pa and 100 Pa must be 10 seconds or more for the container to meet the AQIS Methyl Bromide Standard. • Should the chamber not meet the minimum pressure decay time, the Fumigator must release the pressure from the chamber and rectify the cause as to why the chamber is not holding the required pressure. Containers that give a pressure decay time from 200Pa to 100 Pa of 10 seconds or more are considered gas-tight. Such containers may be fumigated with methyl bromide without enclosing them under gas proof sheets. Where the pressure decay time is less than 10 seconds, the container must be enclosed in gas proof sheets. Specific information relating to finger manifold design can be located in Appendix 6 of the AQIS Methyl Bromide Standard. .			
8.		**What are the requirements for sheeted containers?** For any sheet fumigation, the Approved Fumigator shall ensure: • Fumigation sheets must be positioned or protected with suitable padding to avoid any sharp corners or objects that might damage them; • Sheets must be arranged so that there is at least 500 mm of sheet extending beyond the limit of the seal; • In high winds, ropes or belts must be used to hold fumigation sheets in place to prevent them from flapping loose; • Corners and areas where ropes, electrical leads, gassing pipes and monitoring tubes emerge from	7.4		

Business:			Audit date:		
No.	**Reference**	**Requirement**	**Document reference**	**Compliance Yes/No**	**Comments/Remarks**
		between or under the sheets must be tightly sealed; • Loose fumigation sheeting on corners of stacks must be secured by folding, rolling and clipping to prevent blowing out in the wind; and • Where more than one container is being fumigated under sheet, at least one door of each container must be fully opened.			
9.		**How do you calculate the volume of a fumigation enclosure?**	7.6		
10.		**How do you calculate free airspace in a fumigation enclosure?** The Approved Fumigator shall ensure that adequate air space is maintained between stacked goods to allow effective circulation of the fumigant. The AQIS Methyl Bromide Fumigation Standard advises there should be at least 350mm of free airspace in total with 200 mm free airspace above the goods, 50 mm below the goods and the remaining 100 mm at the sides and between the goods. The Approved Fumigator shall either have the container re-packed if there is insufficient airspace within the container or have the container unpacked and fumigate the goods as a stack.	7.7		
11.		**What are the packaging requirements when conducting a fumigation?** The Approved Fumigator shall ensure the goods to be fumigated are not coated with materials that are impervious to methyl bromide. Impervious surfaces and coatings such as paints, lacquers, veneers may prevent the effective penetration of methyl bromide. The Approved Fumigator shall also ensure impervious wrappings such	7.8		

Business:			Audit date:		
No.	**Reference**	**Requirement**	**Document reference**	**Compliance Yes/No**	**Comments/Remarks**
		as plastic, tarred or waxed papers and aluminium foil are perforated, cut or removed prior to fumigation to allow the effective penetration of methyl bromide. If the consignment cannot be inspected for impervious materials due to inaccessibility, the Approved Fumigator shall either rely on a packing declaration from the packer or other party that packed the container or advise the business exporting the goods that the container will need to be unpacked for inspection prior to fumigation. The Approved Fumigator shall not undertake a fumigation until the status of the packaging has been established. When undertaking fumigations of untreated timber products, the Approved Fumigator shall ensure the timber products have at least one physical dimension which is less than 200mm thick.			
12.		**What is the requirement for the fumigant supply lines?** The Approved Fumigator shall place the fumigant supply lines within an enclosure to effectively introduce and allow dispersal of the gas around the commodity. The Approved Fumigator shall ensure the fumigant supply lines are as far as practicable from the fumigant monitoring tubes. Where multiple containers are under one enclosure (sheeted fumigation), the Approved Fumigator shall place a fumigant supply line in each container. The Approved Fumigator shall take precautions to prevent any liquid fumigant coming in contact with the commodity being fumigated, therefore impermeable sheeting or a tray may be used to cover the commodity near to where the fumigant supply valve is located. The covering should not touch the commodity and must be placed to allow the fumigant to circulate around the commodity. The Approved Fumigator shall ensure that adequate fan	7.9		

Business:			Audit date:		
No.	**Reference**	**Requirement**	**Document reference**	**Compliance Yes/No**	**Comments/Remarks**
		circulation is provided to circulate the fumigant and the commodity does not obstruct the fumigant supply outlet when loaded. To prevent leakage from the fumigant supply lines, the Approved Fumigator shall: • make a gas-tight seal around every supply line exit point from the enclosure; and • seal the exposed ends after the fumigant has been introduced into the enclosure.			
13.		**What is the requirement for the fumigant monitoring lines?** The Approved Fumigator shall monitor all fumigations. For enclosures larger than 30 cubic metres (equivalent of the average internal volume of a 20 ft shipping container), a minimum of three fumigant monitoring lines must be positioned with the enclosure. For enclosures smaller than 30 cubic metres, a minimum of one fumigant monitoring line must be placed at the top centre of the commodity being fumigated. The Approved Fumigator shall place the fumigant monitoring lines in the fumigation enclosure as follows: **ONE container** must have one monitoring tube placed: • at the top back of the commodity – as far from the doors as possible; • as close to the centre of the commodity as is practicable; • at the front base of the commodity. **TWO containers** (in the one enclosure) must have one monitoring tube placed: • at the top centre of the commodity in each container;	7.10		

Business:			Audit date:		
No.	**Reference**	**Requirement**	**Document reference**	**Compliance Yes/No**	**Comments/Remarks**
		• at the front base of the commodity in either container. **THREE containers or more** (in the one enclosure) must have one monitoring tube placed: • at the top centre			
14.		**How do you calculate the fumigant dosage?** Volume calculation plus ducting etc	7.11		
15.		**Explain the sealed system or loss of weight system when introducing methyl bromide into the fumigation chamber?**	8.1		
16.		**What are the requirement for using the vaporizer during the fumigation?** Although methyl bromide has a low boiling point and will vaporise when released at temperatures above 4.0o C, liquefaction may occur as the gas is released from the delivery cylinder. For this reason a vaporiser or volatiliser must be used to introduce the methyl bromide as a hot gas. A suitable device has part of the copper delivery tube coiled and submerged in hot water. The Fumigator, prior to fumigation, shall ensure the water in the vaporiser unit is raised to near boiling point (boiling point if safe to do so) and maintained at this temperature throughout the delivery of the gas into the chamber. The Fumigator shall monitor the temperature of the fumigant entering the chamber by periodically holding the gas supply pipe from the vaporizer to the fumigation chamber. Should the pipe not feel warm/hot throughout the period in which the gas is introduced, the Fumigator shall stop the introduction of the gas until the water in the vaporiser is re-heated to near boiling point.	8.2		

Business:			Audit date:		
No.	**Reference**	**Requirement**	**Document reference**	**Compliance Yes/No**	**Comments/Remarks**
17.		**What are the requirements for mixing the fumigant in the enclosure?** To ensure adequate mixing of the fumigant, fans shall be used to disperse the gas throughout the enclosure and thereby enhance the penetration of the fumigant. Once the gas is evenly distributed it maintains that condition. The use of high velocity/high volume fans for periods longer than 15 minutes may lead to the fumigant being forced from the enclosure. The Approved Fumigator shall position the fan(s) to ensure the fumigant is rapidly and effectively distributed throughout the fumigation enclosure. For methyl bromide fumigation in small enclosures, at least one fan must be used. For fumigations in larger enclosures, at least two fans must be used. The Approved Fumigator shall ensure where multiple containers are fumigated under the same sheet, fans are placed in each container. The Fumigator shall determine the effective mixing of methyl bromide by monitoring gas concentrations at all monitoring points following the introduction of the gas. Note the gas monitoring must be undertaken when the fan(s) are turned off. If all concentration levels cannot be equalized to within 15% of the lowest reading (equilibrium), the Fumigator shall redistribute the fumigant by turning on the fan for a further period of time. Should equilibrium not be achieved, the fumigation is deemed to have failed and the Fumigator shall identify and rectify the cause and re-dose the chamber. The fumigation cannot commence if the fumigant levels drop below the standard concentration (A) as displayed in Appendix 2 (Methyl Bromide Fumigation Ready Reckoner). The Fumigator shall record the gas concentrations at all monitoring points following the introduction of the gas and record the results on the Fumigation Record. The Fumigator shall also record the calculations made to	8.3		

Business:			Audit date:		
No.	**Reference**	**Requirement**	**Document reference**	**Compliance Yes/No**	**Comments/Remarks**
		demonstrate equilibrium has been achieved.			
18.		**How do you test for leaks after introducing the fumigant into the chamber?**	8.4		
19.		**What are the requirements for monitoring the fumigant concentration?**	8.5		
20.		**What are the requirements for the start point monitoring?**			
21.		**What are the requirements for the end point monitoring?**			
22.		**What are the requirements for topping up?** Topping-up shall only be undertaken when fumigant concentrations are above the minimum top-up level at all monitoring points. When topping-up is done after the end point monitoring the exposure period must be extended for a further 4 hours and final monitoring readings must be taken and recorded. Topping-up must only be undertaken when fumigant concentrations are above the minimum concentration to allow top-up (B) at all monitoring points. Fumigant levels must not be topped-up above the	8.6		

Business:			Audit date:		
No.	**Reference**	**Requirement**	**Document reference**	**Compliance Yes/No**	**Comments/Remarks**
		maximum top-up concentration (C). In addition to the monitoring times in TABLE 2 monitoring must take place at intervals not greater than 6 hours apart throughout the fumigation period if it is suspected that the relevant final concentration will not be achieved. Monitoring at the set times must still be done. Topping-up is not an option for fumigations of less than 12 hours			
23.		**What are the venting requirements after the fumigation has finished?**	9.1		
24.		**How do you identify treated and untreated product after fumigation?**	9.2		
25.		**What are treatment record requirements after the fumigation has been completed?**	9.3		

Business:			**Audit date:**		
No.	**Reference**	**Requirement**	**Document reference**	**Compliance Yes/No**	**Comments/Remarks**
1.		**What are the Responsibilities of the Business Principal and Approved Fumigator?** The Business Principal (or delegate) is responsible for - • training staff in their responsibilities and duties under this Operational Procedure; • ensuring the Approved Fumigator complies with their responsibilities under this Procedure; • ensuring that all fumigation treatments are carried out in accordance with this Operational Procedure; • ensuring all fumigations are performed by an Approved Fumigator; • ensuring the gas monitoring device and detector are calibrated; and • if applicable, ensuring weighing scales are calibrated at least every 6 months. The Approved Fumigator is responsible for - • ensuring that all fumigation treatments are carried out in accordance with this Operational Procedure; • maintaining the fumigation equipment; • determining the rate and dosage of fumigant required for each fumigation; • if applicable, maintaining weighing scale calibration records; • maintaining fumigation treatment records; and • ensuring fumigation treatments comply with local government, environmental and workplace health	5		

Business:			Audit date:		
No.	**Reference**	**Requirement**	**Document reference**	**Compliance Yes/No**	**Comments/Remarks**
		and safety authorities.			
2.		**What are the dosage requirements?** Fumigation with methyl bromide by an Approved Fumigator at a rate that conforms to the entry requirements of the destination country.	6		
3.		**What are the temperature requirements when fumigating?** The Approved Fumigator shall ensure fumigations are not carried out if the ambient minimum temperature falls below 10° C. The Approved Fumigator shall also ensure the fumigant dosage is compensated for ambient temperatures below 21° C. The Approved Fumigator shall ensure for each 5°C (or part of 5°C) the temperature is expected to fall below 21 °C, 8g/m^3 is added to the dosage, unless otherwise specified by the importing country.	6.2		
4.		**What are the fumigation site requirements?** The fumigation site used to conduct methyl bromide fumigation treatments under this procedure must – • have a surface impermeable to the fumigant when the fumigation is carried out under gas proof sheets; • be able to be segregated to minimize any OH&S risks ; • be well ventilated; and • have a reliable power supply available. When the site surface is porous or otherwise unsuitable for conducting a fumigation under gas proof sheets, the Approved Fumigator shall use a floor sheet. Unsuitable	7.1		

Business:			Audit date:		
No.	**Reference**	**Requirement**	**Document reference**	**Compliance Yes/No**	**Comments/Remarks**
		surfaces include soil (including cement consolidated soil), sand, base rock and pavers.			
5.		**What are the fumigation site risk assessment requirements?** The Approved Fumigator shall perform a risk assessment of the fumigation site prior to undertaking a fumigation. The Approved Fumigator shall ensure - • the fumigation site can be secured from unauthorized entry; • the fumigation site is sufficient distance from occupied building and public areas; • the fumigant can be applied and vented safely; and • emergency procedures at the site are in place. The Approved Fumigator shall establish a risk area to a minimum of 3 metres around the fumigation enclosure if outdoors and a minimum of 6 metres around the fumigation enclosure if indoors.	7.2		
6.		**What are the fumigation site safety signage requirements?** The Approved Fumigator shall ensure signage is placed outside the immediate fumigation area as a warning that a fumigation is being undertaken and the signage will remain there from the time the gas is ready to be applied until the enclosure has been ventilated below the TLV. The signage (minimum A4 size paper) will consist of the following details: • Skull and crossbones icon	7.2		

Business:			Audit date:		
No.	**Reference**	**Requirement**	**Document reference**	**Compliance Yes/No**	**Comments/Remarks**
		• The wording 'Danger – Methyl Bromide Fumigation in Progress' • The dosage rate and duration • Time and date the fumigation commenced • Time and date the fumigation is complete • Fumigator name • Container number(s) (if applicable)			
7.		**What are the pressure test requirements for un-sheeted containers?** The Approved Fumigator shall pressure test all un-sheeted containers used for methyl bromide fumigation treatments. A pressure test decay time from 200 to 100 Pa of 10 seconds or more must be achieved to certify that the container is gas-tight. The Approved Fumigator shall record the gas pressure test details on the Fumigation Record (Attachment 1) and undertake the gas pressure test in accordance with the following - • Using a finger manifold and pressure gauge (or similar devices), raise the pressure within the container to 250 Pa and then turn off the compressed air supply. The Fumigator must ensure the pressure within the container is not raised to a pressure that may cause damage to the container seals or ventilators. • The Fumigator must wait until the pressure within the chamber decays to 200 Pa and then record the time taken for the pressure to decay from 200Pa to 100 Pa. This time must be recorded on the	7.3		

Business:			Audit date:		
No.	**Reference**	**Requirement**	**Document reference**	**Compliance Yes/No**	**Comments/Remarks**
		Fumigation Record. • The pressure decay time between 200 Pa and 100 Pa must be 10 seconds or more for the container to meet the AQIS Methyl Bromide Standard. • Should the chamber not meet the minimum pressure decay time, the Fumigator must release the pressure from the chamber and rectify the cause as to why the chamber is not holding the required pressure. Containers that give a pressure decay time from 200Pa to 100 Pa of 10 seconds or more are considered gas-tight. Such containers may be fumigated with methyl bromide without enclosing them under gas proof sheets. Where the pressure decay time is less than 10 seconds, the container must be enclosed in gas proof sheets. Specific information relating to finger manifold design can be located in Appendix 6 of the AQIS Methyl Bromide Standard. .			
8.		**What are the requirements for sheeted containers?** For any sheet fumigation, the Approved Fumigator shall ensure: • Fumigation sheets must be positioned or protected with suitable padding to avoid any sharp corners or objects that might damage them; • Sheets must be arranged so that there is at least 500 mm of sheet extending beyond the limit of the seal; • In high winds, ropes or belts must be used to hold fumigation sheets in place to prevent them from flapping loose; • Corners and areas where ropes, electrical leads, gassing pipes and monitoring tubes emerge from	7.4		

Business:			Audit date:		
No.	**Reference**	**Requirement**	**Document reference**	**Compliance Yes/No**	**Comments/Remarks**
		between or under the sheets must be tightly sealed; • Loose fumigation sheeting on corners of stacks must be secured by folding, rolling and clipping to prevent blowing out in the wind; and • Where more than one container is being fumigated under sheet, at least one door of each container must be fully opened.			
9.		**How do you calculate the volume of a fumigation enclosure?**	7.6		
10.		**How do you calculate free airspace in a fumigation enclosure?** The Approved Fumigator shall ensure that adequate air space is maintained between stacked goods to allow effective circulation of the fumigant. The AQIS Methyl Bromide Fumigation Standard advises there should be at least 350mm of free airspace in total with 200 mm free airspace above the goods, 50 mm below the goods and the remaining 100 mm at the sides and between the goods. The Approved Fumigator shall either have the container re-packed if there is insufficient airspace within the container or have the container unpacked and fumigate the goods as a stack.	7.7		
11.		**What are the packaging requirements when conducting a fumigation?** The Approved Fumigator shall ensure the goods to be fumigated are not coated with materials that are impervious to methyl bromide. Impervious surfaces and coatings such as paints, lacquers, veneers may prevent the effective penetration of methyl bromide. The Approved Fumigator shall also ensure impervious wrappings such	7.8		

Business:			Audit date:		
No.	**Reference**	**Requirement**	**Document reference**	**Compliance Yes/No**	**Comments/Remarks**
		as plastic, tarred or waxed papers and aluminium foil are perforated, cut or removed prior to fumigation to allow the effective penetration of methyl bromide. If the consignment cannot be inspected for impervious materials due to inaccessibility, the Approved Fumigator shall either rely on a packing declaration from the packer or other party that packed the container or advise the business exporting the goods that the container will need to be unpacked for inspection prior to fumigation. The Approved Fumigator shall not undertake a fumigation until the status of the packaging has been established. When undertaking fumigations of untreated timber products, the Approved Fumigator shall ensure the timber products have at least one physical dimension which is less than 200mm thick.			
12.		**What is the requirement for the fumigant supply lines?** The Approved Fumigator shall place the fumigant supply lines within an enclosure to effectively introduce and allow dispersal of the gas around the commodity. The Approved Fumigator shall ensure the fumigant supply lines are as far as practicable from the fumigant monitoring tubes. Where multiple containers are under one enclosure (sheeted fumigation), the Approved Fumigator shall place a fumigant supply line in each container. The Approved Fumigator shall take precautions to prevent any liquid fumigant coming in contact with the commodity being fumigated, therefore impermeable sheeting or a tray may be used to cover the commodity near to where the fumigant supply valve is located. The covering should not touch the commodity and must be placed to allow the fumigant to circulate around the commodity. The Approved Fumigator shall ensure that adequate fan	7.9		

Business:			Audit date:		
No.	**Reference**	**Requirement**	**Document reference**	**Compliance Yes/No**	**Comments/Remarks**
		circulation is provided to circulate the fumigant and the commodity does not obstruct the fumigant supply outlet when loaded. To prevent leakage from the fumigant supply lines, the Approved Fumigator shall: • make a gas-tight seal around every supply line exit point from the enclosure; and • seal the exposed ends after the fumigant has been introduced into the enclosure.			
13.		**What is the requirement for the fumigant monitoring lines?** The Approved Fumigator shall monitor all fumigations. For enclosures larger than 30 cubic metres (equivalent of the average internal volume of a 20 ft shipping container), a minimum of three fumigant monitoring lines must be positioned with the enclosure. For enclosures smaller than 30 cubic metres, a minimum of one fumigant monitoring line must be placed at the top centre of the commodity being fumigated. The Approved Fumigator shall place the fumigant monitoring lines in the fumigation enclosure as follows: **ONE container** must have one monitoring tube placed: • at the top back of the commodity – as far from the doors as possible; • as close to the centre of the commodity as is practicable; • at the front base of the commodity. **TWO containers** (in the one enclosure) must have one monitoring tube placed: • at the top centre of the commodity in each container;	7.10		

Business:			Audit date:		
No.	**Reference**	**Requirement**	**Document reference**	**Compliance Yes/No**	**Comments/Remarks**
		• at the front base of the commodity in either container. **THREE containers or more** (in the one enclosure) must have one monitoring tube placed: • at the top centre			
14.		**How do you calculate the fumigant dosage?** Volume calculation plus ducting etc	7.11		
15.		**Explain the sealed system or loss of weight system when introducing methyl bromide into the fumigation chamber?**	8.1		
16.		**What are the requirement for using the vaporizer during the fumigation?** Although methyl bromide has a low boiling point and will vaporise when released at temperatures above 4.0o C, liquefaction may occur as the gas is released from the delivery cylinder. For this reason a vaporiser or volatiliser must be used to introduce the methyl bromide as a hot gas. A suitable device has part of the copper delivery tube coiled and submerged in hot water. The Fumigator, prior to fumigation, shall ensure the water in the vaporiser unit is raised to near boiling point (boiling point if safe to do so) and maintained at this temperature throughout the delivery of the gas into the chamber. The Fumigator shall monitor the temperature of the fumigant entering the chamber by periodically holding the gas supply pipe from the vaporizer to the fumigation chamber. Should the pipe not feel warm/hot throughout the period in which the gas is introduced, the Fumigator shall stop the introduction of the gas until the water in the vaporiser is re-heated to near boiling point.	8.2		

Business:			Audit date:		
No.	**Reference**	**Requirement**	**Document reference**	**Compliance Yes/No**	**Comments/Remarks**
17.		**What are the requirements for mixing the fumigant in the enclosure?** To ensure adequate mixing of the fumigant, fans shall be used to disperse the gas throughout the enclosure and thereby enhance the penetration of the fumigant. Once the gas is evenly distributed it maintains that condition. The use of high velocity/high volume fans for periods longer than 15 minutes may lead to the fumigant being forced from the enclosure. The Approved Fumigator shall position the fan(s) to ensure the fumigant is rapidly and effectively distributed throughout the fumigation enclosure. For methyl bromide fumigation in small enclosures, at least one fan must be used. For fumigations in larger enclosures, at least two fans must be used. The Approved Fumigator shall ensure where multiple containers are fumigated under the same sheet, fans are placed in each container. The Fumigator shall determine the effective mixing of methyl bromide by monitoring gas concentrations at all monitoring points following the introduction of the gas. Note the gas monitoring must be undertaken when the fan(s) are turned off. If all concentration levels cannot be equalized to within 15% of the lowest reading (equilibrium), the Fumigator shall redistribute the fumigant by turning on the fan for a further period of time. Should equilibrium not be achieved, the fumigation is deemed to have failed and the Fumigator shall identify and rectify the cause and re-dose the chamber. The fumigation cannot commence if the fumigant levels drop below the standard concentration (A) as displayed in Appendix 2 (Methyl Bromide Fumigation Ready Reckoner). The Fumigator shall record the gas concentrations at all monitoring points following the introduction of the gas and record the results on the Fumigation Record. The Fumigator shall also record the calculations made to	8.3		

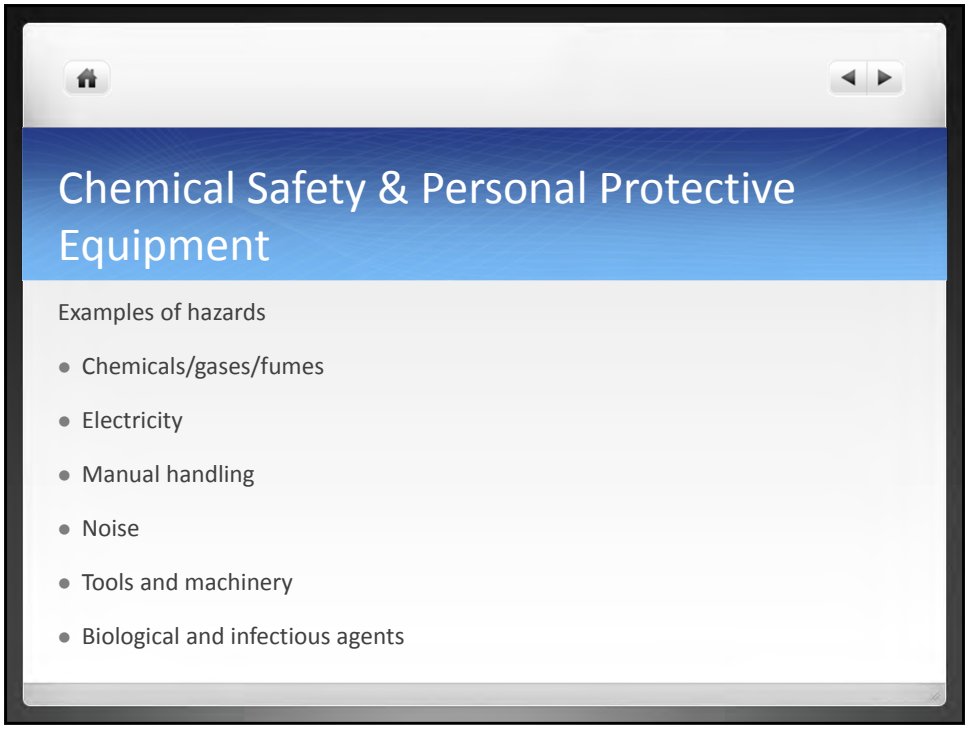
Business:			Audit date:		
No.	**Reference**	**Requirement**	**Document reference**	**Compliance Yes/No**	**Comments/Remarks**
		demonstrate equilibrium has been achieved.			
18.		**How do you test for leaks after introducing the fumigant into the chamber?**	8.4		
19.		**What are the requirements for monitoring the fumigant concentration?**	8.5		
20.		**What are the requirements for the start point monitoring?**			
21.		**What are the requirements for the end point monitoring?**			
22.		**What are the requirements for topping up?** Topping-up shall only be undertaken when fumigant concentrations are above the minimum top-up level at all monitoring points. When topping-up is done after the end point monitoring the exposure period must be extended for a further 4 hours and final monitoring readings must be taken and recorded. Topping-up must only be undertaken when fumigant concentrations are above the minimum concentration to allow top-up (B) at all monitoring points. Fumigant levels must not be topped-up above the	8.6		

Business:			Audit date:		
No.	**Reference**	**Requirement**	**Document reference**	**Compliance Yes/No**	**Comments/Remarks**
		maximum top-up concentration (C). In addition to the monitoring times in TABLE 2 monitoring must take place at intervals not greater than 6 hours apart throughout the fumigation period if it is suspected that the relevant final concentration will not be achieved. Monitoring at the set times must still be done. Topping-up is not an option for fumigations of less than 12 hours			
23.		**What are the venting requirements after the fumigation has finished?**	9.1		
24.		**How do you identify treated and untreated product after fumigation?**	9.2		
25.		**What are treatment record requirements after the fumigation has been completed?**	9.3		


Safety & Personal Protective Equipment
Fumigation with Methyl Bromide


Safety & Personal Protective Equipment
Session Purpose
List steps to Risk Management
State options for controlling risks
State what respiratory protection is and points to consider
Discuss types of RPE


Safety & Personal Protective Equipment
HAZARD
SOMETHING WITH THE POTENTIAL TO CAUSE HARM.
RISK
THE POSSIBILITY OF INJURY OR LOSS WHEN EXPOSED OT THE HAZARD


Chemical Safety & Personal Protective Equipment
Examples of hazards
Chemicals/gases/fumes
Electricity
Manual handling
Noise
Tools and machinery
Biological and infectious agents

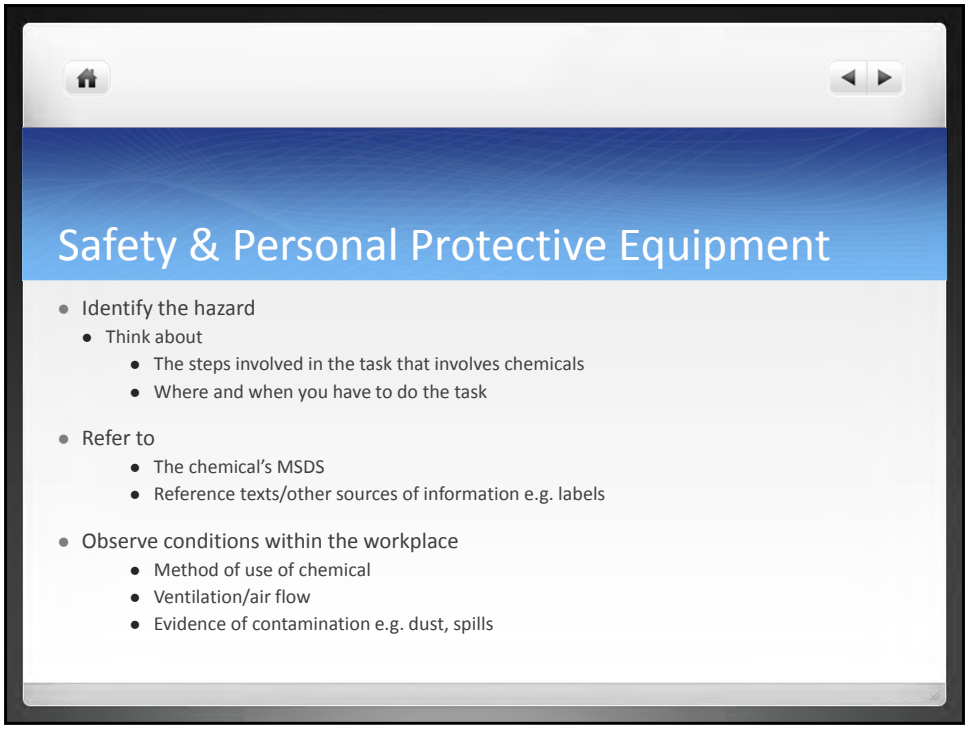

Chemical Safety & Personal Protective Equipment
Chemicals
Drugs and poisons
Agricultural/Veterinary
Hazardous substances
Dangerous goods


Safety & Personal Protective Equipment
Types and Effects of Chemicals
Flammable and combustible
Fire, burns
Explosive or reactive
Explosions, violent reaction, toxic fumes
Burns, physical injuries, poisoning
Irritant
Irritating to skin, eyes, lungs
Ithching, dermatitis, coughing
Corrosive
Chemical burns


Safety & Personal Protective Equipment
Types and Effects of Chemicals
Sensitising
Allergic reactions
Toxic
Poisonous to body organs and systems e.g. nerves
Carcinogenic
Causes cancer
Teratogenic
Affects embryo and or fetus development


Safety & Personal Protective Equipment
Routes of entry
Ingestion (via mouth)
Inhalation
Skin Absorption
Eyes and mucous membranes


Safety & Personal Protective Equipment
Managing risk and exposure to chemicals
Identifying the hazards
Determine the level of risk
Decide how best to reduce/eliminate the risk of injury or illness
Put safety (control) measures in place
Check the control measures are effective and are adhered to
This is called risk management


Safety & Personal Protective Equipment
Identify the hazard
Think about
The steps involved in the task that involves chemicals
Where and when you have to do the task
Refer to
The chemical's MSDS
Reference texts/other sources of information e.g. labels
Observe conditions within the workplace
Method of use of chemical
Ventilation/air flow
Evidence of contamination e.g. dust, spills

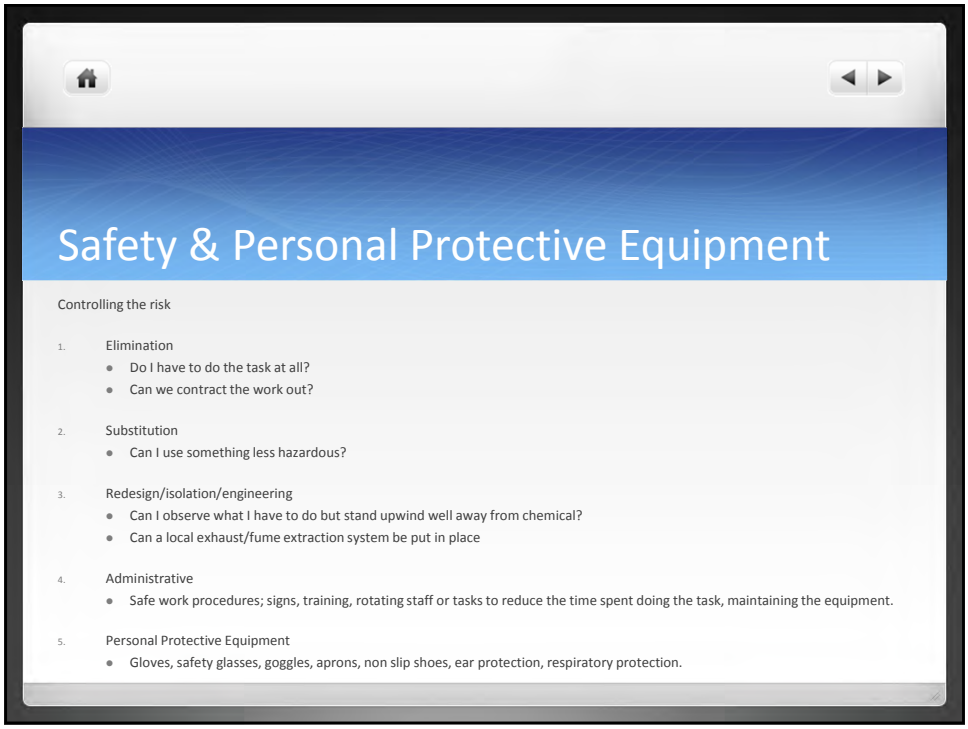
Safety & Personal Protective Equipment

Assessing the risk

- Consider
  - How often you are likely to be exposed
  - How long you may be exposed
  - Concentration of the chemical\route of entry and amount taken in
  - Health effects associated with the chemical
  - Severity of health effects
- Determine the level of risk using the Risk Matrix
- The higher the risk, the more urgent the action

Safety & Personal Protective Equipment

Likelihood	Consequences				
	Negligible	Minor	Moderate	Major	Severe
Almost certain	Medium	High	High	Very High	Very High
Likely	Medium	Medium	High	High	Very High
Possible	Low	Medium	Medium	High	High
Unlikely	Low	Low	Medium	Medium	High
Rare	Low	Low	Low	Medium	Medium


Safety & Personal Protective Equipment
Controlling the risk
1. Elimination
• Do I have to do the task at all?
• Can we contract the work out?
2. Substitution
• Can I use something less hazardous?
3. Redesign/isolation/engineering
• Can I observe what I have to do but stand upwind well away from chemical?
• Can a local exhaust/fume extraction system be put in place
4. Administrative
• Safe work procedures; signs, training, rotating staff or tasks to reduce the time spent doing the task, maintaining the equipment.
5. Personal Protective Equipment
• Gloves, safety glasses, goggles, aprons, non slip shoes, ear protection, respiratory protection.


Safety & Personal Protective Equipment
Controlling risks
• Once hazards are identified and level of risk determined, control measures must be put in place to reduce the risk of injury or illness to workers and others
• Hierarchy of Control – from most to least effective
1) Eliminate the hazard
2) Substitute with a less hazardous option
3) Redesign/engineer out/isolate the hazard or worker
4) Administrative controls
5) Personal protective equipment

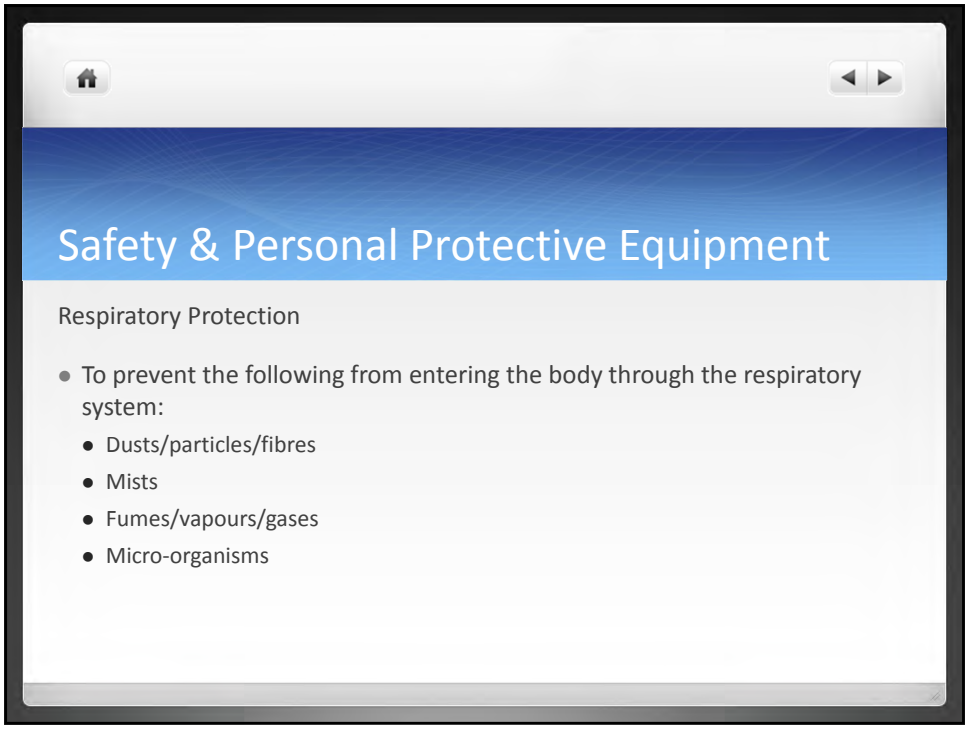

Safety & Personal Protective Equipment
Personal Protective Equipment
Any clothing, equipment or substance designed to protect a person from risks of injury or illness
Provides a barrier between the worker and the hazard rather than controlling the hazard at the source
Least effective control measure because its success depends on it
Being the correct type for the task
Being worn and used correctly
Being maintained in good condition

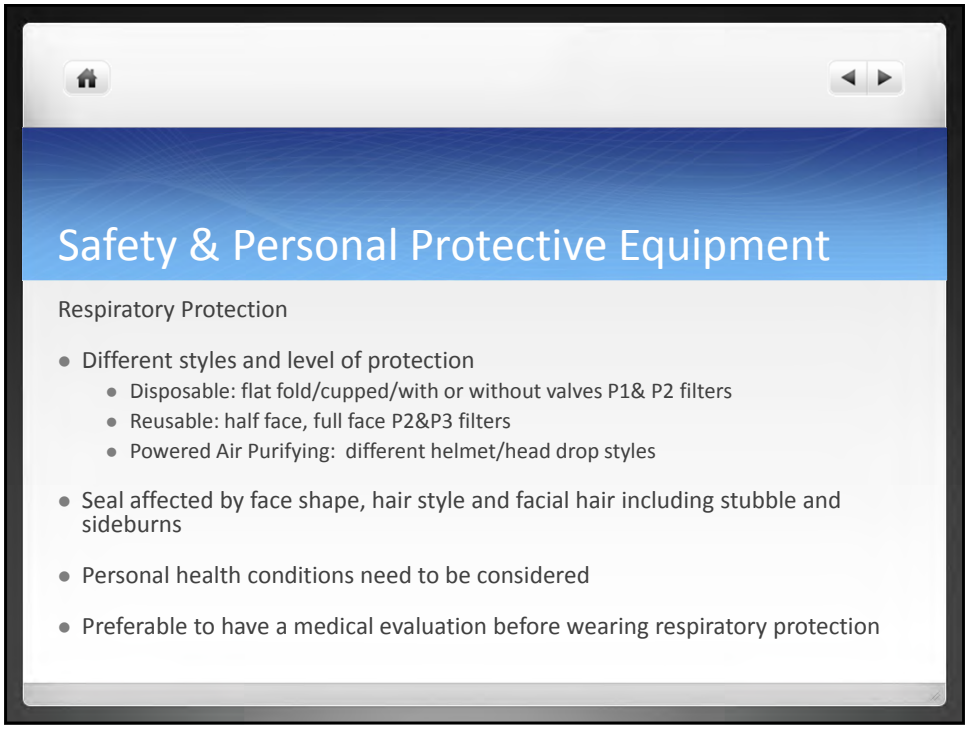

Safety & Personal Protective Equipment
Selecting and using PPE
Risk assessment
Identify activities
List hazards present
Determine the risks and level of protection required
Consider if the use of PPE will create other issues
Determine level of protection required
What part of the body needs protection
Type of protection required
Identify any standards regarding performance /protection levels


Safety & Personal Protective Equipment
Selecting and using PPE
To provide the level of protection it is designed to, PPE must:
Fit properly
Be appropriate for the type of work
Be appropriate for the hazard and level of risk
Used for the purpose for which it was designed and as per manufacturers instructions
Regularly checked and maintained, or replaced as required.


Safety & Personal Protective Equipment
Maintaining and storing PPE
Keep PPE in a clean and ready to use state
Check for wear/breaks/cracks and replace if need be
Check disposable items have not perished (e.g. gloves)
Store in a readily accessible place where not damaged or affected by sun/heat


Safety & Personal Protective Equipment
Types of Personal protective Equipment
Clothing
Footwear
Gloves
Eye and face protection
Hearing protection
Respiratory protection


Safety & Personal Protective Equipment
Respiratory Protection
To prevent the following from entering the body through the respiratory system:
Dusts/particles/fibres
Mists
Fumes/vapours/gases
Micro-organisms


Safety & Personal Protective Equipment
Respiratory Protection
Different styles and level of protection
Disposable: flat fold/cupped/with or without valves P1& P2 filters
Reusable: half face, full face P2&P3 filters
Powered Air Purifying: different helmet/head drop styles
Seal affected by face shape, hair style and facial hair including stubble and sideburns
Personal health conditions need to be considered
Preferable to have a medical evaluation before wearing respiratory protection


Safety & Personal Protective Equipment
Respiratory Protection
Important points
The correct respirator is available, selected and used correctly
The respirator fits (i.e. fit tested and fit checked)
The respirator is cleaned, maintained and stored correctly
Appropriate records kept (e.g. use and maintenance records)
Any problems/other hazards arising from the use of the respirator must be reported
Any incidents relating to the failure of respirators must be reported

Safety & Personal Protective Equipment

- Choosing the correct respirator and filter
- Consider:
  - Type of air-borne contaminant that you need protection from
  - User characteristics that affect the fit
  - Different filters for different chemicals and particulates
  - Depends on chemical properties e.g boiling point, acid, inorganic or organic
  - Examples:
    - P for particulates
    - AX (organic gases and vapours (below 65 C) e.g. methyl bromide
    - A-P3 for Chlorpyrifos, Diazinon
    - B for phosphine
    - P3 for Atrizine

Safety & Personal Protective Equipment

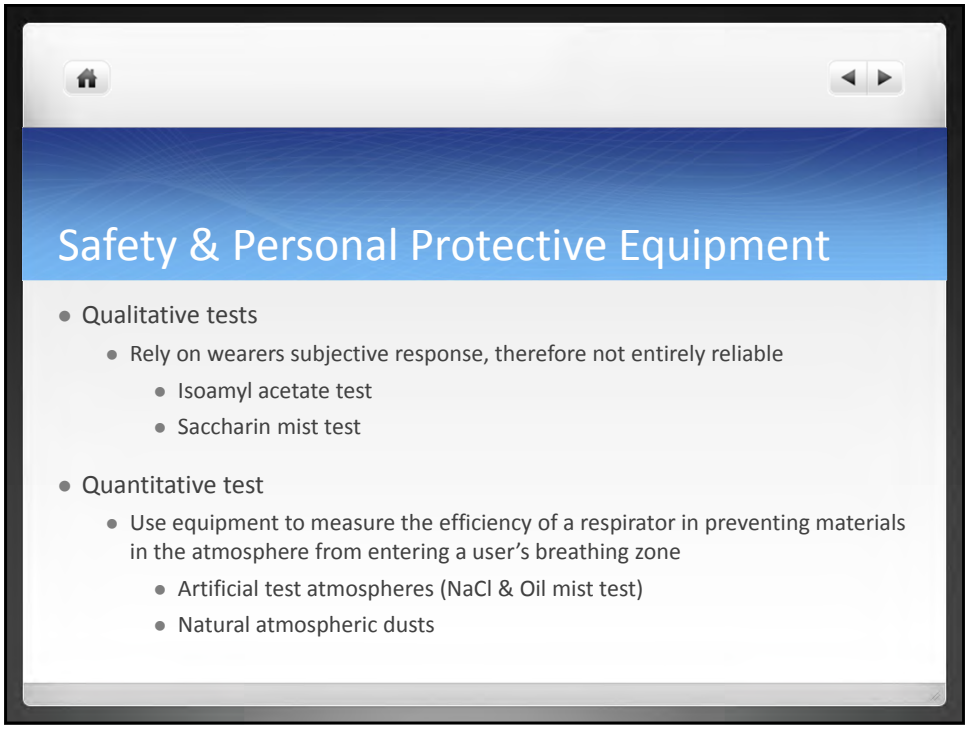
- Fit Testing vs Fit Checking
  - Fit testing
    - To determine how well the face piece of the respirator fits the face of the wearer
    - If a good seal is not achieved, the respirator will not provide the level of protection it was designed to
- Fit Checking
  - Use to check you have the mask fitted properly/ a good seal before entering the hazardous area
  - Negative pressure check
  - Positive pressure check

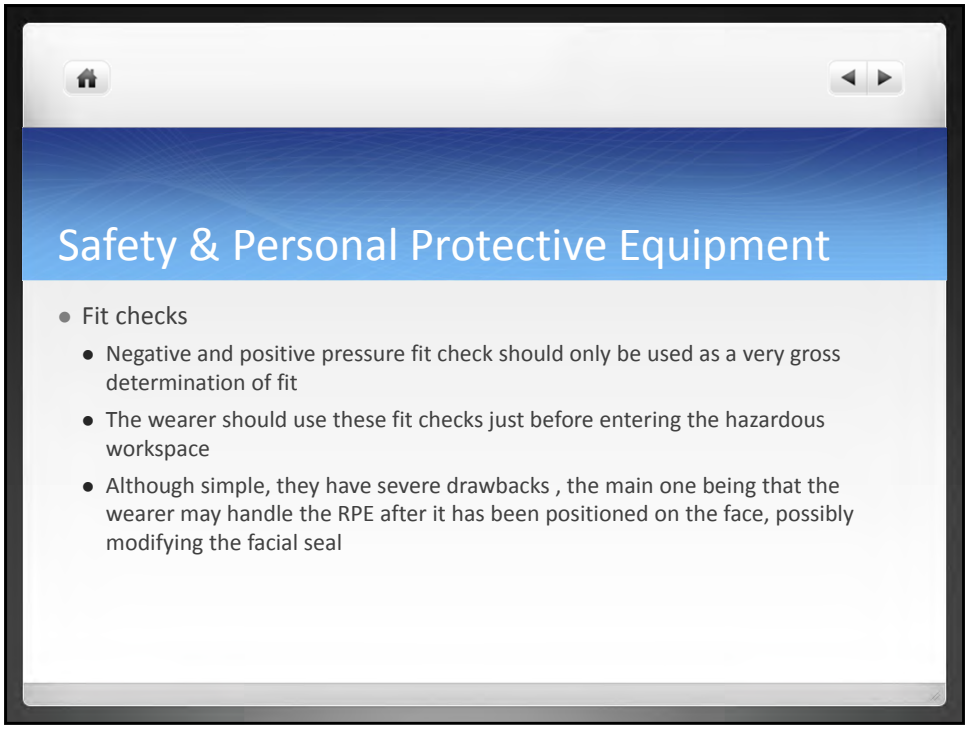
Safety & Personal Protective Equipment

- Fit testing
- Fit tests should be performed regularly, particularly when the wearer's facial characteristics e.g. loss of teeth, excessive weight change
- Facial hair lying between the sealing surface of the respirator and the wearers skin will prevent a good seal.
- Long hair may also interfere with the operation of the exhalation valves
- Eye correction when spectacles not used should be tested

Safety & Personal Protective Equipment

- Fit Testing
  - Two types (qualitative and quantitative)
    - Both types depend on the type of RPE to be fit tested, the extent of RPE usage and the available resources of trained personnel and capital


Safety & Personal Protective Equipment
Qualitative tests
Rely on wearers subjective response, therefore not entirely reliable
Isoamyl acetate test
Saccharin mist test
Quantitative test
Use equipment to measure the efficiency of a respirator in preventing materials in the atmosphere from entering a user's breathing zone
Artificial test atmospheres (NaCl & Oil mist test)
Natural atmospheric dusts


Safety & Personal Protective Equipment
Fit checks
Negative and positive pressure fit check should only be used as a very gross determination of fit
The wearer should use these fit checks just before entering the hazardous workspace
Although simple, they have severe drawbacks , the main one being that the wearer may handle the RPE after it has been positioned on the face, possibly modifying the facial seal

Safety & Personal Protective Equipment

- Cleaning and storing respirator
  - Must be cleaned after each use
    - Remove filter
    - Wash respirator with warm soapy water
    - Do not use solvents
  - If necessary to disinfect, use recommended disinfectant
  - Allow to dry
  - Store filter (if able to be re-used) in a sealable plastic bag or else dispose of
  - Store respirator away from sunlight and heat, and preferable in a cloth bag to prevent scratching

Safety & Personal Protective Equipment

- Maintaining the respirator
  - Check all parts of the respirator before and after use for:
    - Cracks/tears/scratches/distortion
    - Hardening tackiness
    - Loss of elasticity
    - Broken buckles/attachments
    - Harness straps damaged/not holding
    - Valves not functioning
  - Replace faulty parts
  - Replace filter as per manufactures instructions


Safety & Personal Protective Equipment
Record Keeping
Fit testing
Respirator and filter use
How long filter used/how much time left
Checks and maintenance carried out


Safety & Personal Protective Equipment
Issues relating to PPE use
Respirators can create further issues including
Feeling not able to breathe easily
Feeling of suffocation/claustrophobia
Making communication more difficult
Added bulk/general discomfort
Loss of dexterity
Vision/ability to wear spectacles may be affected
Heat stress


Safety & Personal Protective Equipment
Session Summary
Define hazard and risk
List steps to Risk Management
State options for controlling risks
Discuss types of RPE

TELL ME ABOUT THIS CHEMICAL?

Completed by:_____

Using the Material Safety Data Sheet (MSDS) supplied, answer the following questions

CHEMICAL NAME	
USE	
POISON SCHEDULE	
HAZARDOUS SUBSTANCE?	
DANGEROUS GOODS CLASS	
WHEN COULD YOU BE EXPOSED?	
HEALTH & SAFETY HAZARDS	
SAFETY MEASURES	
FIRST AID	

Taken from the *POISONS STANDARD 2012*

CLASSIFICATION

Poisons are classified according to the Schedules in which they are included. The following is a general description of the Schedules. For the legal definitions, however, it is necessary to check with each relevant State or Territory authority.

Schedule 1. This Schedule is intentionally blank.

Schedule 2. **Pharmacy Medicine** – Substances, the safe use of which may require advice from a pharmacist and which should be available from a pharmacy or, where a pharmacy service is not available, from a licensed person.

Schedule 3. **Pharmacist Only Medicine** – Substances, the safe use of which requires professional advice but which should be available to the public from a pharmacist without a prescription.

Schedule 4. **Prescription Only Medicine,** or **Prescription Animal Remedy** – Substances, the use or supply of which should be by or on the order of persons permitted by State or Territory legislation to prescribe and should be available from a pharmacist on prescription.

Schedule 5. **Caution** – Substances with a low potential for causing harm, the extent of which can be reduced through the use of appropriate packaging with simple warnings and safety directions on the label.

Schedule 6. **Poison** – Substances with a moderate potential for causing harm, the extent of which can be reduced through the use of distinctive packaging with strong warnings and safety directions on the label.

Schedule 7. **Dangerous Poison** – Substances with a high potential for causing harm at low exposure and which require special precautions during manufacture, handling or use. These poisons should be available only to specialised or authorised users who have the skills necessary to handle them safely. Special regulations restricting their availability, possession, storage or use may apply.

Schedule 8. **Controlled Drug** – Substances which should be available for use but require restriction of manufacture, supply, distribution, possession and use to reduce abuse, misuse and physical or psychological dependence.

Schedule 9. **Prohibited Substance** – Substances which may be abused or misused, the manufacture, possession, sale or use of which should be prohibited by law except when required for medical or scientific research, or for analytical, teaching or training purposes with approval of Commonwealth and/or State or Territory Health Authorities.

REGIONAL 06 – Implementation of the Australian Fumigation Accreditation Scheme (AFAS) for PHAMA countries (Report - Solomon Islands 10 – 22 March 2012)

Table of Contents

1. Summary

This input carries over from the October 2012 PHAMA input when a scoping visit was conducted of the Solomon Islands to assess practices, facilities and equipment used to conduct methyl bromide fumigation treatments. The findings of the October 2012 visit identified that although a number of fumigations were being conducted by industry to meet importing country phytosanitary requirements, there were no regulatory controls imposed by the Solomon Islands Agriculture Quarantine Service (SIAQS) and fumigations were not being conducted to any set standard or procedure.

Workshops and meetings were held during this input with the SIAQS and industry stakeholders with the aim to seek agreement on a methyl bromide fumigation standard (based on principles of the Australian Fumigation Accreditation Scheme [AFAS]) and to also establish an accreditation framework whereby industry could be accredited to perform fumigations on behalf of the SIAQS to an agreed standard. The proposed accreditation framework would also consist of a fee component for the audit function and sanctions should accredited businesses be found noncompliant.

Additional to the consultation to gain agreement on an accreditation framework, auditor training was conducted to provide SIAQS staff with an understanding of auditing terminology and techniques and the skills necessary to undertake an audit. Specifically, the pilot auditor-training course was conducted to provide SIAQS staff with the skills and knowledge necessary to effectively manage an accreditation scheme whereby industry would be accredited to perform fumigations on behalf of the SIAQS.

Safety and personal protective equipment (PPE) training was also undertaken by seven SIAQS staff during this input following the purchase of gas monitor and leak detection devices and PPE by PHAMA for the SIAQS. The training focused on risk management, options for controlling risks and the types of respiratory protection equipment.

Agreement during this input was reached by the SIAQS to implement a methyl bromide fumigation standard (based on the AFAS standard) and to also establish an accreditation framework whereby industry would be approved to perform fumigations on behalf of the SIAQS to an agreed standard.

With the majority of industry stakeholders yet to undertake the AFAS training, the consensus from industry was that further comment on a fumigation accreditation scheme would be provided following the AFAS training that will be conducted in the Solomon Islands in April 2013.

2. Introduction

From the previous scoping visit conducted in October 2012 it was identified that the majority of methyl bromide fumigation treatments being conducted in the Solomon Islands were for containerized sawn timber being exported to Australia, New Zealand and South East Asia. Although a number of these fumigation treatments were being endorsed by the SIAQS, neither the treatment providers or SIAQS were monitoring the treatments and no standard nor consistent fumigation measures were being applied. As a consequence, other countries have questioned the efficacy of treatments endorsed by the SIAQS on phytosanitary certificates.

The previous scoping visit also identified that SIAQS staff had not undergone fumigation training in any capacity since the late 1990's and were not in possession of fumigation equipment to conduct or monitor a fumigation, neither did they possess personal protective equipment.

As a component of PHAMA Regional 06 - Implementation of the Australian Fumigation Accreditation Scheme (AFAS) for PHAMA countries, this input concentrated on establishing a workable fumigation standard that could be implemented by industry in the Solomon Islands, an accreditation framework for treatment providers that could be readily managed by the SIAQS and structured training of SIAQS staff in the skills and knowledge to be able to effectively manage an accreditation framework.

3. Fumigation Standard & Operational Procedure

With no standard or consistent fumigation practices being performed when conducting methyl bromide fumigation treatments, a draft fumigation operational procedure 'Operational Procedure – Fumigation with Methyl Bromide' (Attachment 1) was developed. The operational procedure's aim is as a primary document to both establish a standard for methyl bromide treatments in the Solomon Islands and to also identify roles, responsibilities and the scope of accreditation for industry should a fumigation accreditation scheme be introduced.

The draft operational procedure is described as a 'prescriptive quality manual' in that treatment providers are not required to develop and document their own quality manual based around their own particular business, rather the operational procedure has been developed and will be agreed to as part of a consultative process with SIAQS and businesses/providers. This process should make the proposed fumigation accreditation scheme simpler to implement.

SIAQS Consultation

Consultation with the SIAQS to seek agreement on the adoption of the draft operational procedure and standard was conducted during the first week of this input.

There was extensive discussion relating to whether the fumigation equipment costs (in adopting the AFAS standard as the proposed fumigation standard) would prevent potential treatment providers from becoming accredited. Estimated costs for the fumigation equipment for each business independently (if the AFAS standard was adopted as the proposed standard) would be in excess of $AUD 10, 000. Discussion also ensued as to whether equipment could potentially be shared amongst different accredited treatment providers.

The outcome of the SIAQS consultation was that the proposed standard 'Operational Procedure – Fumigation with Methyl Bromide' (Attachment 1) be adopted as the fumigation standard pending minor typographical amendments and agreement from industry stakeholders.

Industry Consultation

Industry consultation to seek agreement on the adoption of a proposed fumigation standard and procedure was conducted at a meeting on 19 March 2013 and attended by 12 participants (Appendix 2). A PowerPoint presentation (attachment 2) was provided to the industry representatives at this meeting.

The meeting attendees were advised that the previous PHAMA input in October 2012 had identified inconsistent fumigation practices being conducted by treatment providers and that these practices could lead to a failed fumigation and the potential for rejection of this treated product overseas. The attendees were also advised that the SIAQS had an obligation as a National Plant Protection Organisation to ensure fumigations were being conducted correctly if they were to be endorsed on a phytosanitary certification.

With the mail out/delivery of the fumigation procedure (that had been endorsed by SIAQS) not reaching recipients prior to the consultation meeting it was difficult for attendees to comment. Additionally, as not all industry attendees had undertaken the AFAS training, some concepts relating to fumigation with methyl bromide were unfamiliar.

The consensus from the meeting from the industry attendees was that further comment on the procedure (if any) would be provided following the AFAS training that would be conducted in April 2013.

4. Fumigation Accreditation Scheme

The SIAQS had indicated as part of the previous PHAMA input in October 2012 a willingness for industry to perform the role of treatment providers for methyl bromide fumigation treatments and for the SIAQS to audit the providers to ensure they were meeting an agreed standard. It was unclear however whether SIAQS had articulated their willingness for industry to perform the role of treatment providers for methyl bromide fumigations treatment to industry prior to this input.

The proposed accreditation scheme would rely on accredited businesses to undertake a methyl bromide fumigation treatment in accordance with the documented procedure and complete a fumigation treatment record for presentation to SIAQS in order for the treatment to be endorsed on the phytosanitary certificate. Verification that treatments by industry/providers were being carried out correctly would be made through an audit and verification process conducted by the SIAQS.

SIAQS Consultation

As a component of the pilot auditor training course, SIAQS staff were introduced to the proposed Fumigation Accreditation Scheme (FAS) whereby industry would be accredited to perform fumigations on behalf of the SIAQS. The benefits of the FAS for SIAQS would include more flexibility and better utilisation of resources and increased confidence that overseas quarantine fumigation treatment requirements were being met as the FAS has defined requirements, process controls and defined roles and responsibilities.

Although attendees at the pilot training had no previous auditing experience or exposure to quality management principles, the benefits of the FAS were readily apparent to SIAQS staff and the proposed FAS was readily endorsed by the attendees.

Whilst the FAS was endorsed at the pilot training, it was decided that a fees and sanctions framework would not be established until the SIAQS Biosecurity Bill was enacted in April 2013.

Industry Consultation

Industry consultation to seek agreement on the adoption of the proposed FAS was conducted at the same meeting the fumigation standard was discussed (19 March 2013). As with the SIAQS staff, the majority of industry participants at this meeting had no previous exposure to quality management principles as proposed for the FAS.

At the meeting it was articulated that the benefits from the adoption of the FAS for industry would include a potential for reduced certification costs, improved industry awareness of quality management principals leading to industry efficiencies and improved staff participation in ensuring effective product treatment occurs through formal training and documented procedures.

The consensus from the meeting from the industry attendees was that further comment on the FAS (if any) would be provided following the AFAS training that would be conducted in April 2013.

Staged approach to establishing the FAS

As identified, the SIAQS and industry have had little previous exposure to the quality management principles proposed in the FAS, particularly in a regulatory environment. It was therefore raised during the industry meeting to consider what would be considered a staged approach to the implementation of the FAS.

It was proposed that prior to accrediting businesses to perform methyl bromide fumigation treatments, a partnership approach would be implemented that would see industry and SIAQS performing fumigations together for a period of time to ensure both parties were comfortable with the operational procedure and documentation. When SIAQS were confident the business was performing fumigations to the agreed standard, the business would then apply for accreditation under the FAS and an initial audit would be undertaken. Following a successful initial audit, the business would then be accredited to perform fumigations without supervision by SIAQS.

This suggested approach would ensure businesses were capable of performing the fumigation to an agreed standard before seeking accreditation and SIAQS staff would also be fully conversant with how to conduct a fumigation and therefore would have the appropriate skills and knowledge to audit the accreditation.

5. Pilot Auditor Training Course

For a proposed FAS to be implemented in the Solomon Islands, SIAQS staff would require appropriate skills and knowledge to be able to effectively audit the accreditation scheme. As SIAQS staff have had little or no exposure to quality management and auditing principals, a pilot auditor training course was developed (attachment 3) to enable SIAQS to effectively audit the proposed FAS.

The pilot Auditor Training Course was conducted over three days and was attended by six senior staff (Appendix 1) from SIAQS. The six participants that attended the course had varying levels of experience with conducting fumigations, however all participants would have involvement in the day-to-day management of the proposed FAS. As the course was a pilot, participants were not required to complete the assessment for the course.

An important component of the Auditor-Training Course was for an on-site mock audit to be conducted. To achieve the desired learning outcomes when conducting the mock audit, a business needed to be identified that maintained a quality system comparable to the proposed FAS. Due to timing, no on-site mock audit was conducted.

Although an on-site mock audit didn't occur as part of the pilot Auditor Training Course, SIAQS staff that attended the training were introduced to the documented quality manual

Sol Fish were using to meet the import requirements for copra meal to Australia. Audit checklist questions were drafted using this manual as a basis to provide the participants with knowledge and skills on how to draft audit checklists. Additionally, participants as part of the Audit Training Course were also provided with as series of example records that they would potentially be exposed to as part of an audit and were asked to identify nonconformities in these records.

At the completion of the Auditor Training Course the participants agreed the content of the course was relevant and endorsed that the Auditor Training Course should be delivered to other members of the SIAQS during the next PHAMA input in April 2013.

6. Safety and Personal Protective Equipment Training

Safety and PPE training was undertaken by seven SIAQS staff during this input (Appendix 3) following the purchase of gas monitor and leak detection devices and PPE by PHAMA for the SIAQS. The safety and PPE training consisted of a presentation and assessment (attachment 4), along with a practical exercise on correct fitting of the PPE (gas mask and canister).

SIAQS staff attending this training were introduced to the concept of risk management relating to personal safety, options for controlling risks and considerations and types of respiratory protective equipment. At the completion of the Safety and PPE training the participants agreed the content of the course was relevant and should be delivered to other members of the SIAQS during the PHAMA input in April 2013.

7. Conclusion

With methyl bromide fumigation treatments not being performed to any set standard or procedure and no regulatory controls being imposed, it is evident SIAQS are not meeting specific obligations as a NPPO when endorsing methyl bromide fumigation treatments on phytosanitary certificates. This situation has led to importing countries questioning the reliability of the fumigation treatments in the Solomon Islands and could ultimately lead to a loss of market access.

To remedy this malaise, SIAQS are enthusiastic to both set a fumigation standard and establish an accreditation framework whereby industry would be accredited to perform fumigations on behalf of the SIAQS to an agreed standard. The fumigation standard and accreditation framework however will need to be both practical and flexible for the SIAQS and industry to follow and allow sufficient competition amongst treatment providers to ensure treatment costs are competitive however performed to an acceptable level.

As indicated in this report, SIAQS staff have little previous exposure to auditing and quality management principles. As such, the proposal to introduce an accreditation scheme based on quality assurance principles with an audit regime is a significant step from previous practices undertaken by SIAQS. It would therefore be expected much of the fumigation accreditation scheme implementation process with industry will be a 'learn-as-you-go' process, however this will be an ideal opportunity also to build rapport between the SIAQS and industry.

It should also be mentioned that during informal discussion with SIAQS staff during this input, it was apparent that there is a desire to establish similar accreditations to the proposed fumigation accreditation scheme across the SIAQS approved premises area and post entry quarantine facilities.

With SIAQS staff now trained in contemporary audit techniques, this will now provide the necessary skills for these staff to undertake audits if the proposed fumigation accreditation scheme is endorsed by industry and established. Similarly, there is opportunity for SIAQS to now examine (as mentioned above) other quarantine functions that may also be suitable to transition to industry accreditations.

Importantly, the newly learnt auditing skills are transportable with the potential for the current copra meal accreditations for Australia to be audited by SIAQS prior to a DAFF compliance audit. The aim of the SIAQS audit of these facilities would be to ultimately negotiate for less frequent visits by DAFF based on regular documented audits by SIAQS.

It should be mentioned that auditing, like many skills, requires practice and this will only be gained by undertaking audits. It is a recommendation therefore from this input that further mentoring be undertaken with SIAQS staff to assist in establishing the fumigation accreditation scheme (subject to industry endorsement) and to assist in the development of an audit regime and schedule for SIAQS to effectively audit the current copra meal accreditations for Australia.

8. Attachments

- Attachment 1 – Operational Procedure – Fumigation with Methyl Bromide
- Attachment 2 – PowerPoint Presentation – Operational Procedure - Fumigation with Methyl Bromide Industry Consultation
- Attachment 3 – Auditor Training Course Participants Notes
- Attachment 4 – PowerPoint Presentation Auditor Training Course
- Attachment 5 – Assessment Part One SI
- Attachment 6 – Mock Audit Training Documents
- Attachment 7 – File Note FAS001
- Attachment 8 – Audit Report FAS002
- Attachment 9 – Audit Agenda FAS003
- Attachment 10 – Audit Attendance Sheet FAS004
- Attachment 11 – NCR FAS005
- Attachment 12 – Audit Checklist FAS006
- Attachment 13 – Approved Business Application Form
- Attachment 14 – Audit Checklist Solomon Islands
- Attachment 15 – RPE Presentation
- Attachment 16 – Tell me about this chemical

9. Appendices

Appendix 1 - Participants List for Auditor Training Course

Name	Position
Francis Tsatsia	Director Quarantine Services
Max Kolubalona	Quarantine Services
John Papulu	Quarantine Services
Irene Nanau	Quarantine Services
Ishmail Bresamana	Quarantine Services
Crispus Fanai	Quarantine Services

Appendix 2 - Industry Consultation Attendees

Name	Position
Francis Tsatsia	Director Quarantine Services
Patterson Akipu	Deputy Director Quarantine Services
Max Kolubalona	Quarantine Services
John Papulu	Quarantine Services
Irene Nanau	Quarantine Services
Michelle Lam Banuk	Solfish
Rocky Sama	Island Enterprises
Anderson Lee	Island Enterprises
Gordon Mwakamwane	VATA
Eric Tolilalo	VATA
Jack Koti	Farmers Fumigation
John Bufhoro	Solomon Islands Ports

Appendix 3 - Participants list for Safety and Personal Protective Equipment Training

Name	Position
Francis Tsatsia	Director Quarantine Services
Patterson Akipu	Deputy Director Quarantine Services
Max Kolubalona	Quarantine Services
John Papulu	Quarantine Services
Irene Nanau	Quarantine Services
Ishmail Bresamana	Quarantine Services
Crispus Fanai	Quarantine Services

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