

# Managing noise and preventing hearing loss at work

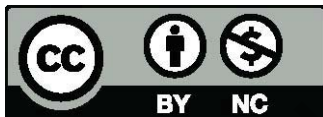
Code of Practice 2011

This Queensland code of practice was made by the Minister for Education and Industrial Relations on 27 November 2011 and published in the Queensland Government Gazette on 2 December 2011.

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This code is based on a national model code of practice developed by Safe Work Australia and approved by the Workplace Relations Ministers' Council on 10 August 2011 as part of the harmonisation of work health and safety laws.

This code was varied on 30 May 2014 following a review of work health and safety laws in Queensland.



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# Foreword

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This Code of Practice for managing noise and preventing hearing loss at work is an approved code of practice under section 274 of the *Work Health and Safety Act 2011* (the WHS Act).

An approved code of practice is a practical guide to achieving the standards of health, safety and welfare required under the WHS Act and the *Work Health and Safety Regulation 2011* (the WHS Regulation).

A code of practice applies to anyone who has a duty of care in the circumstances described in the code. In most cases, following an approved code of practice would achieve compliance with the health and safety duties in the WHS Act, in relation to the subject matter of the code. Like regulations, codes of practice deal with particular issues and do not cover all hazards or risks that may arise. The health and safety duties require duty holders to consider all risks associated with work, not only those for which regulations and codes of practice exist.

Codes of practice are admissible in court proceedings under the WHS Act and Regulations. Courts may regard a code of practice as evidence of what is known about a hazard, risk or control and may rely on the code in determining what is reasonably practicable in the circumstances to which the code relates.

Compliance with the WHS Act and Regulations may be achieved by following another method, such as a technical or an industry standard, if it provides an equivalent or higher standard of work health and safety than the code.

An inspector may refer to an approved code of practice when issuing an improvement or prohibition notice.

This Code of Practice has been developed by Safe Work Australia as a model code of practice under the Council of Australian Governments' *Inter-Governmental Agreement for Regulatory and Operational Reform in Occupational Health and Safety* for adoption by the Commonwealth, state and territory governments.

A draft of this Code of Practice was released for public consultation on 7 December 2010 and was endorsed by the Workplace Relations Ministers' Council on 10 August 2011.

This code was varied on 30 May 2014 following a review of work health and safety laws in Queensland.

## Scope and application

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This Code of Practice applies to all types of work and all workplaces covered by the WHS Act where there is the potential for exposure to noise that can contribute to hearing loss. It provides practical guidance to persons conducting a business or undertaking on how noise affects hearing, how to identify and assess exposure to noise and how to control health and safety risks arising from hazardous noise.

Although the WHS Regulations for noise are limited to managing the risks of hearing loss, the duties in the WHS Act extend to all health and safety risks arising from the conduct of a business or undertaking and therefore this Code also includes information about other agents that may contribute to hearing loss in Appendix A.

### *How to use this Code of Practice*

In providing guidance, the word 'should' is used in this Code to indicate a recommended course of action, while 'may' is used to indicate an optional course of action.

This Code also includes various references to sections of the WHS Act and Regulations which set out the legal requirements. These references are not exhaustive. The words 'must', 'requires' or 'mandatory' indicate that a legal requirement exists and must be complied with.

# 1. Introduction

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Hazardous noise can destroy the ability to hear clearly and can also make it more difficult to hear sounds necessary for working safely, such as instructions or warning signals.

Managing the risks related to noise will assist in:

- protecting workers from hearing loss and disabling tinnitus (ringing in the ears or head)
- improving the conditions for communication and hearing warning sounds
- creating a less stressful and more productive work environment.

## 1.1 Who has health and safety duties in relation to noise?

A **person conducting a business or undertaking** has the primary duty under the WHS Act to ensure, so far as is reasonably practicable, that workers and other persons are not exposed to health and safety risks arising from the business or undertaking.

A person conducting a business or undertaking has more specific obligations under the WHS Regulations to manage the risks of hearing loss associated with noise at the workplace, including ensuring that the noise a worker is exposed to at the workplace does not exceed the exposure standard for noise.

**Designers, manufacturers, suppliers, importers and installers** of plant or structures that could be used for work must ensure, so far as is reasonably practicable, that the plant or structure is without risks to health and safety. Designers and manufacturers of plant must ensure the plant is designed and manufactured so that its noise emission is as low as reasonably practicable.

Designers, manufacturers, suppliers and importers must also provide information about the noise emission values of the plant and any conditions necessary for minimising the risk of hearing loss and other harm (see Chapter 7 of this Code).

**Officers**, such as company directors, have a duty to exercise due diligence to ensure that the business or undertaking complies with the WHS Act and Regulations. This includes taking reasonable steps to ensure that the business or undertaking has and uses appropriate resources and processes to eliminate or minimise risks that arise from noise.

**Workers** have a duty to take reasonable care for their own health and safety and that they do not adversely affect the health and safety of other persons. Workers must comply with any reasonable instruction and cooperate with any reasonable policy or procedure relating to health and safety at the workplace. For example, if personal hearing protectors are provided by the person conducting the business or undertaking, the worker must use them in accordance with the information, instruction and training provided on their use.

## 1.2 The meaning of key terms

**Decibel (dB)** is the unit for measuring sound levels.

**Exposure standard for noise** is defined in the WHS Regulations as an  $L_{Aeq,8h}$  of 85 dB(A) or an  $L_{C,peak}$  of 140 dB(C). There are two parts to the exposure standard for noise because noise can either cause gradual hearing loss over a period of time or be so loud that it causes immediate hearing loss.

**$L_{Aeq,8h}$**  means the eight hour equivalent continuous A-weighted sound pressure level in decibels, referenced to 20 micropascals, determined in accordance with AS/NZS 1269.1. This is related to the total amount of noise energy a person is exposed to in the course of their working day. It takes account of both the noise level and the length of time the person is exposed to it. An unacceptable risk of hearing loss occurs at  $L_{Aeq,8h}$  values above 85 dB(A).

**$L_{C,peak}$**  means the C-weighted peak sound pressure level in decibels, referenced to 20 micropascals, determined in accordance with AS/NZS 1269.1. It usually relates to loud, sudden noises such as a gunshot or hammering.  $L_{C,peak}$  values above 140 dB(C) can cause immediate damage to hearing.

**Hazardous noise** in relation to hearing loss means noise that exceeds the exposure standard for noise in the workplace.

**Risk control** means taking action to first eliminate health and safety risks so far as is reasonably practicable, and if that is not possible, minimising the risks so far as is reasonably practicable. Eliminating a hazard will also eliminate any risks associated with that hazard.

### 1.3 What is required to *manage the risks* of hearing loss?

**R. 34-38:** In order to manage risk under the WHS Regulations, a duty holder must:

- a) identify reasonably foreseeable hazards that could give rise to the risk
- b) eliminate the risk so far as is reasonably practicable
- c) if it is not reasonably practicable to eliminate the risk – minimise the risk so far as is reasonably practicable by implementing control measures in accordance with the hierarchy of control
- d) maintain the implemented control measure so that it remains effective
- d) review, and if necessary revise, risk control measures so as to maintain, so far as is reasonably practicable, a work environment that is without risks to health and safety.

This Code provides guidance on how to manage the risks of hearing loss associated with noise by following a systematic process that involves:

- identifying sources of noise that may cause or contribute to hearing loss,
- if necessary, assessing the risks associated with these hazards,
- implementing risk control measures
- reviewing risk control measures.

Guidance on the general risk management process is available in the *Code of Practice: How to Manage Work Health and Safety Risks*.

#### **Consulting your workers**

Consultation involves sharing of information, giving workers a reasonable opportunity to express views and taking those views into account before making decisions on health and safety matters.

**S. 47:** The WHS Act requires that you consult, so far as is reasonably practicable, with workers who carry out work for you who are (or are likely to be) directly affected by a work health and safety matter.

**S. 48:** If the workers are represented by a health and safety representative, the consultation must involve that representative.

Consultation with workers and their health and safety representatives is required at each step of the risk management process. By drawing on the experience, knowledge and ideas of your workers you are more likely to identify all hazards and choose effective control measures.

You must also consult your workers when proposing to make any changes that may affect their health and safety, for example when planning to buy new machinery or equipment.

Health and safety representatives must have access to relevant information such as noise exposure data and potential control options. If you have a health and safety committee, you should engage the committee in the process as well.

#### **Consulting, co-operating and co-ordinating activities with other duty holders**

**S. 46:** The WHS Act requires that you consult, co-operate and co-ordinate activities with all other persons who have a work health or safety duty in relation to the same matter, so far as is reasonably practicable.

Sometimes you may share responsibility for a health and safety matter with other business operators who are involved in the same activities or who share the same workplace. In these situations, you should exchange information to find out who is doing what and work together in a co-operative and co-ordinated way so that all risks are eliminated or minimised as far as reasonably practicable.

For example, if you own or manage an on-hire business and your workers work at other workplaces then you must consult the host business so far as is reasonably practicable to determine if your workers could be exposed to hazardous noise and agree on what you each will do to control any associated risks.

Further guidance is available in the *Code of Practice: Work Health and Safety Consultation, Co-operation and Co-ordination*.

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## 2. Noise and its effects on health and safety

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### 2.1 How does hearing loss occur?

Hazardous noise affects the functioning of the inner ear, which may cause temporary hearing loss. After a period of time away from noise, hearing may be restored. With further exposure to hazardous noise, the ear will gradually lose its ability to recover and the hearing loss will become permanent.

Permanent hearing loss can also occur suddenly if a person is exposed to very loud impact or explosive sounds. This type of damage is known as acoustic trauma.

Permanent hearing loss results from the destruction of hair cells in the inner ear. These cells cannot be replaced or repaired by any presently known medical treatments or technology.

Usually, hazardous noise first affects the ability to hear high-frequency (high-pitched) sounds. This means that even though a person can still hear some sounds, conversation will start to sound 'muffled' and a person may find it difficult to understand what is being said.

Communication difficulties occur especially when there are competing background noises. Modern hearing aids may improve the ability to hear speech but they are unable to completely restore the clarity of the full hearing function.

Workers exposed to hazardous noise may also experience tinnitus, which could become permanent. When severe, it may disrupt sleep, reduce concentration, make people extremely irritable and lead to depression.

The degree of hearing loss that occurs is dependent on how loud the noise is, how long someone is exposed to it and, to some extent, individual susceptibility. The frequency or pitch can also have some effect on hearing loss, since high-pitched sounds are more damaging than low-pitched ones.

Exposure to a number of common industrial chemicals and some medications can also cause hearing loss or exacerbate the effects of noise on hearing. These substances are called ototoxic substances.

Ototoxic substances absorbed into the bloodstream may damage the cochlea in the inner ear and/or the auditory pathways to the brain, leading to hearing loss and tinnitus. Hearing loss is more likely if exposure is to a combination of substances or a combination of the substance and noise.

There is also some evidence that exposure to hand transmitted vibrations can exacerbate the effects of noise on hearing.

Further information on these other causes of hearing loss is provided in Appendix A.

### 2.2 How much noise is too much?

Whether the exposure standard of 85 dB(A) averaged over eight hours is exceeded depends on the level of noise involved and how long workers are exposed to it.

Peak noise levels greater than 140 dB(C) usually occur with impact or explosive noise such as sledge-hammering or a gun shot. Any exposure above this peak can create almost instant damage to hearing.

Decibels are not like normal numbers. They can't be added or subtracted in the normal way. The decibel scale is logarithmic. On this scale, an increase of 3 dB therefore represents a doubling or twice as much sound energy. This means that the length of time a worker could be exposed to the noise is reduced by half for every 3 dB increase in noise level if the same noise energy is to be received.

Table 1 below demonstrates the length of time a person without hearing protectors can be exposed before the standard is exceeded.



Table 1: Equivalent Noise Exposures	
L <sub>Aeq,8h</sub> = 85 dB(A)	
Noise Level dB(A)	Exposure Time
80	16 hours <sup>1</sup>
82	12hours <sup>1</sup>
85	8 hours
88	4 hours
91	2 hours
94	1 hour
97	30 minutes
100	15 minutes
103	7.5 minutes
106	3.8 minutes
109	1.9 minutes
112	57 seconds
115	28.8 seconds
118	14.4 seconds
121	7.2 seconds
124	3.6 seconds
127	1.8 seconds
130	0.9 seconds

Essentially, a worker who is exposed to 85 dB(A) for 8 hours receives the same noise energy as someone exposed to 88 dB(A) for 4 hours, with the balance of the day in a very quiet environment. In both cases the exposure standard is not being exceeded. However, being exposed to 88 dB(A) for more than 4 hours would mean that the standard is exceeded. Similarly, if a worker is using a machine that generates 121 dB(A) then the exposure standard would be exceeded after only 7.2 seconds.

There is a big range in different people's susceptibility to hearing loss from noise. Research shows that 8-hour average daily noise exposure levels below 75 dB(A) or instantaneous peak noise levels below 130 dB(C) are unlikely to cause hearing loss. With progressively increasing levels, the risk becomes greater.

The WHS Regulations set the exposure standard for noise at an L<sub>Aeq,8h</sub> of 85 dB(A) and a peak noise level at 140 dB(C), which protects most but not all people. Therefore, workplace noise should be kept lower than the exposure standard for noise if reasonably practicable.

## 2.3 Other effects of noise

Noise at levels that do not damage hearing can have other adverse health effects. This can arise when noise chronically interferes with concentration and communication. Persistent noise stress can increase the risk of fatigue and cardiovascular disorders including high blood pressure and heart disease.

<sup>1</sup> The adjustment factor for extended workshifts shown in Table 3 of this Code is taken into account.

Although safe levels to guard against these effects have not yet been fully determined, as a guide, the risk of adverse health effects can be minimised by keeping noise levels below:

- 50 dB(A) where work is being carried out that requires high concentration or effortless conversation
- 70 dB(A) where more routine work is being carried out that requires speed or attentiveness or where it is important to carry on conversations.

These levels include the noise from other work being carried out within the workplace.

To work safely, workers must be able to hear warning signals above any other noise (ambient noise) at the workplace. For reversing alarms on mobile plant, the guidance in ISO:9533: 2010 *Earth-moving machinery – Machine-mounted audible travel alarms and forward horns – Test methods and performance criteria* should be followed. This requires the noise level of the alarm at potential reception points to be at least as high as the noise from the engine under high idle.

For other situations, the levels needed are higher – at least 65 dB(A) and more than 15 dB(A) greater than the ambient noise level at any position in the signal reception area. More detailed guidance on assessing the audibility of warning signals can be found in ISO 7731:2003 *Ergonomics – Danger signals for public and work areas – Auditory danger signals*.

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## 3. How to identify the hazards

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The potential for noise to be hazardous is not always obvious. Hazard identification is a way of finding out which work activities have the potential to contribute to hearing loss or other harm caused by noise.

Exposure to noise is cumulative and a worker may perform a number of noisy work activities over time which, in combination, may expose the worker to hazardous noise.

### 3.1 How to find noise hazards

You may not need specialist skills to identify sources of hazardous noise, but you must undertake the process in consultation with your workers and their health and safety representatives. As a guide, if you need to raise your voice to communicate with someone about one metre away, the noise is likely to be hazardous to hearing.

A checklist is provided in Appendix B to help you further with this process.

#### ***Inspect the workplace***

Regularly walking around the workplace, talking to workers and observing how things are done can help you identify noise hazards. Find out where noise is coming from and which tasks or processes produce noise. Take immediate action to control noise where this is possible, for example fix loose panels that are vibrating and rattling during machine operation.

#### ***Review available information***

Information regarding noise levels from the manufacturers or suppliers of plant and equipment used at the workplace should be obtained.

Information and advice about hazards and risks relevant to particular industries and work activities is also available from regulators, industry associations, unions, technical specialists and safety consultants.

You should check whether any workers' compensation claims have been made for hearing loss and if any hearing loss or tinnitus has been found during repeat audiometric testing. If a worker's hearing has been affected and has been attributed to a particular task, then a hazard may exist that could affect other workers.

Table 2 below lists common noise sources and their typical sound levels which can be used to compare whether noise in the workplace sounds as loud as or louder than 85 dB(A).

**Table 2: Common noise sources and their typical sound levels**

Typical sound level in dB	Sound source
140	Jet engine at 30m
130	Rivet hammer (pain can be felt at this threshold)
120	Rock drill
110	Chain saw
100	Sheet-metal workshop
90	Lawn-mower
85	Front-end loader
80	Kerbside Heavy traffic
	Lathe
70	Loud conversation
60	Normal conversation
40	Quiet radio music
30	Whispering
0	Hearing threshold

### 3.2 What happens next?

In consultation with your workers and health and safety representatives, make a list of all noisy activities that may pose a risk to the health and safety of persons at the workplace. If you have answered 'yes' to any of the questions in Appendix B, it is likely that your workers are being exposed to hazardous noise. If you are unsure about the level of exposure or how to eliminate or minimise the risks effectively, you should take the next step to assess the risks of hearing loss.

## 4. How to assess the risks

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### 4.1 When should a risk assessment be conducted?

If you have identified any noisy activities that may expose your workers or other people at your workplace to hazardous noise then, unless you can reduce the exposures to below the standard immediately, you should assess the risks by carrying out a noise assessment.

A noise assessment will help you:

- identify which workers are at risk of hearing loss
- determine what noise sources and processes are causing that risk
- identify if and what kind of noise control measures could be implemented
- check the effectiveness of existing control measures.

A noise assessment may not always need measurement. For example, if only one activity at the workplace – the use of a single machine – involves noise above 85 dB(A) and the manufacturer has provided information about the machine's noise levels when it is operated in particular ways, then a sufficient assessment can be made without measurement. More complex situations may require measurement to accurately determine a worker's exposure to noise, such as workplaces with variable noise levels over a shift and jobs where workers move in and out of noisy areas.

### 4.2 Who can do a noise assessment?

A noise assessment should be done by a competent person in accordance with the procedures in AS/NZS 1269.1 *Measurement and assessment of noise immission and exposure*. The more complex the situation, the more knowledgeable and experienced the person needs to be.

A competent person is one who has accurately calibrated noise measuring instruments and, through training and experience:

- understands what is required by the WHS Regulations for noise
- knows how to check the performance of the instruments
- knows how to take the measurements properly
- can interpret the results of the noise measurements.

### 4.3 How should a noise assessment be done?

The way a noise assessment is done will depend upon:

- the type of workplace
- the number of persons potentially at risk from exposure to hazardous noise
- the information already available on noise at the workplace.

A noise assessment should be done during a typical working shift and should determine:

- the noise levels produced during various tasks carried out during the shift
- how long your workers are exposed to noise during each of these tasks.

An assessment should take into account:

- plant, equipment and other sources of noise in operation at the workplace
- how work activities are carried out
- the length of the shift
- environmental factors (e.g. types of walls, surfaces, layout of work stations).

This means that adequate information about the tasks and their frequency is needed, so consultation with workers and their supervisors is essential.

Noise measurements should be taken at 0.1 to 0.2 metres from the worker's ear canal entrance over a period of time that is representative of the noise produced during the tasks.

In most situations the use of a hand-held integrating sound level meter will produce the most useful information for choosing appropriate noise control measures. In situations where workers

are highly mobile or access for the person taking the measurement is difficult or unsafe, it may be more appropriate to use personal sound exposure meters (dose meters).

Noise measurements should include the combined noise levels of all the tools, machines and processes present as well as the background noise from ventilation systems, cooling compressors, circulation pumps, etc. To identify which noise sources contribute most to workers' exposures, the noise from each source or work activity should also be measured separately.

The Ready Reckoner in Appendix C may be used to work out the total  $L_{Aeq,8h}$  for combinations of noise levels and exposure duration for each work activity and the relative importance of each.

If a group of workers is exposed to identical sources of noise and their exposure is likely to be the same, then you do not need a separate assessment for each worker. A representative assessment can be done for one or more of the workers.

### **Extended work shifts**

Shift durations of 10 hours or longer involve a degree of risk greater than that indicated by the 8 hour measurement  $L_{Aeq,8h}$ . This increase in risk arises because of the additional damaging effect of continuous exposure to noise after 10 hours. The risk may be further increased if there is reduced recovery time between successive shifts.

If workers work shifts of 10 hours or more, the adjustment factor for extended shifts as set out in AS/NZS 1269.1 (see Table 3) should be added to the measured  $L_{Aeq,8h}$  before comparing it with the 85 dB(A) exposure standard for noise.

**Table 3: Adjustments to  $L_{Aeq,8h}$  for extended work shifts**

<b>Shift length</b>	<b>Adjustment added to measured <math>L_{Aeq,8h}</math> dB(A)</b>
10 hrs or more to less than 14 hrs	+ 1
14 hrs or more to less than 20 hrs	+ 2
20 hrs or more	+ 3

For example, if a worker works 12-hour shifts and the typical  $L_{Aeq,8h}$  has been determined to be 93 dB(A), an additional one decibel is added to give an adjusted  $L_{Aeq,8h}$  of 94 dB(A). Hence the worker's  $L_{Aeq,8h}$  exceeds the exposure standard for noise by 9 dB(A). For a fully worked example see Appendix C.

If workers work more than five days per week, the weekly averaging procedure of AS/NZS 1269.1 should be used.

## **4.4 What information should be included in a noise assessment report?**

Noise assessment reports should show that the assessment was done properly and that all factors were taken into account. An assessment report should contain all the information shown in Appendix D. Noise assessment reports should be used to select appropriate control measures. The main findings should be included in training for all workers. The reports should be made available to managers, health and safety representatives and regulators.

## 5. How to control the risks

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The most important step in the risk management process involves eliminating the risks, or if that is not reasonably practicable, minimising the risks so far as is reasonably practicable.

### 5.1 The hierarchy of risk control

The WHS Regulations require duty holders to work through a hierarchy of control to choose the control measure that most effectively eliminates or minimises the risk in the circumstances. The hierarchy ranks the ways of controlling the risk of hearing loss from noise from the highest level of protection and reliability to the lowest so that the most effective controls are considered first.

Effective risk control may involve a single control measure or a combination of two or more different controls.

#### ***Eliminate the risk***

The most effective control measure is to eliminate the source of noise completely, for example by ceasing to use a noisy machine, changing the way work is carried out so hazardous noise is not produced or by not introducing the hazard into the workplace.

#### ***Minimise the risk***

If it is not reasonably practicable to eliminate the source of noise, you must minimise the risk associated with hearing loss so far as is reasonably practicable. This includes ensuring that the noise does not exceed the exposure standard by choosing one or more of the following measures:

- substitute the hazard with plant or processes that are quieter
- modify plant and processes to reduce the noise using engineering controls
- isolate the source of noise from people by using distance, barriers, enclosures and sound-absorbing surfaces.

If there is a remaining risk, it must be minimised so far as is reasonably practicable by implementing administrative controls, and if a risk still remains, then suitable personal protective equipment must be provided and used. These two types of control measures, when used on their own, tend to be least effective in minimising risks because they rely on human behaviour and supervision.

### 5.2 Substituting plant or processes to reduce noise

#### ***Buy 'quiet'***

One of the most cost-effective and long-term ways of reducing noise at work is to introduce a purchasing and hiring policy to choose the quietest plant for the job. This can be done by obtaining information on noise emission (for example, data on sound power level or sound pressure level at the operator position) from the manufacturer, importer or supplier of plant and comparing it to determine the quietest plant.

Ask the suppliers about the likely noise emission under the particular conditions in which you will operate the machinery, as well as under standard test conditions. If you ask the same question to all suppliers you can compare information. Sound power level data will only ever be a guide as many factors affect the actual noise levels experienced by your workers, but it will help you buy quieter machines.

You should purchase or hire only from suppliers who can demonstrate a low noise design, with noise control as a standard part of the machine, not as an optional extra.

#### ***Change the way you do the job***

A different way of doing the job may provide the same result with a lot less noise. For example, bending metal in a vice or a press is quieter than hammering it into shape, welding is generally quieter than riveting, gluing is quieter than hammering in nails, clipping is quieter than stapling, and lowering materials in a controlled manner is quieter than dropping them on hard surfaces.



## 5.3 Using engineering controls

A good understanding of the operation of the plant or process is necessary when considering ways of minimising noise at its source.

Examples of engineering control measures include:

- eliminating impacts between hard objects or surfaces
- minimising the drop height of objects or the angle that they fall onto hard surfaces
- using absorbent lining on surfaces to cushion the fall or impact of objects
- fitting exhaust mufflers on internal combustion engines
- fitting silencers to compressed air exhausts and blowing nozzles
- isolating a vibrating noise source to separate it from the surface on which it is mounted using rubber mounts and flexible connections
- ensuring gears mesh together better
- fixing damping materials (such as rubber) or stiffening to panels to reduce vibration
- fitting sound-absorbing materials to hard reflective surfaces
- turning down volume controls
- changing fan speeds or the speeds of particular components
- changing the material the equipment or its parts are made of (change metal components to plastic components).

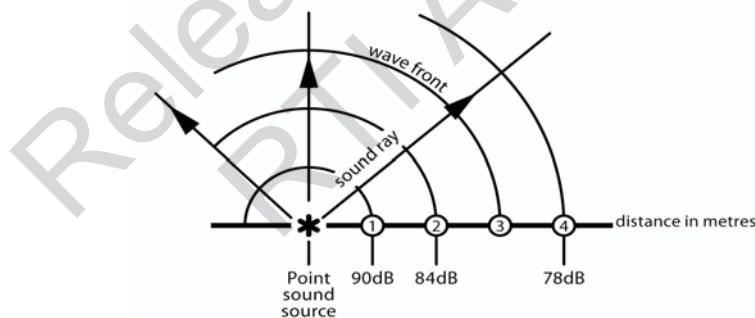
Further information on using engineering controls is at Appendix E.

## 5.4 Isolating the source of noise

Examples of isolating the source of noise from workers include:

- building enclosures or sound proof covers around noise sources
- using barriers or screens to block the direct path of sound
- locating noise sources further away from workers (see Figure 1)
- using remote controls to operate noisy plant from a distance.

**Figure 1:** Sound spreading in an open space away from reflecting surfaces and measured at a certain distance from the source is reduced by about 6 dB for each doubling of that distance. Sound is reduced less when spreading inside an enclosed space.



If a small sound source produces a sound level of 90 dB(A) at a distance of 1 metre, the sound level at 2 metres distance is 84 dB(A), and at 4 metres is 78 dB(A), etc.

### **Maintenance**

Regular maintenance of plant and equipment is essential as it will deteriorate with age and can become noisier. Check for changes in noise levels – badly worn bearings and gears, poor lubrication, blunt blades, loose parts, unbalanced rotating parts and steam or air leaks all create noise that can be reduced with good maintenance. Engineering controls such as vibration mountings, impact absorbers, gaskets, seals, silencers, barriers and other equipment should be regularly inspected and maintained.

## 5.5 Using administrative controls

Administrative noise control measures reduce the amount of noise to which a person is exposed by reducing the time they are exposed to it. Examples include:

- organising schedules so that noisy work is done when only a few workers are present
- notifying workers and others in advance of noisy work so they can limit their exposure to it
- keeping workers out of noisy areas if their work does not require them to be there
- sign-posting noisy areas and restricting access
- providing quiet areas for rest breaks for workers exposed to noisy work
- limiting the time workers spend in noisy areas by moving them to quiet work before their daily noise exposure levels exceed the exposure standard.

If you rely on administrative controls, you should conduct regular checks to ensure that they are being complied with.

## 5.6 Using personal hearing protectors

**R. 44:** If personal protective equipment (PPE) is to be used at the workplace, the person conducting the business or undertaking must ensure that the equipment is:

- selected to minimise risk to health and safety
- suitable for the nature of the work and any hazard associated with the work
- a suitable size and fit and reasonably comfortable for the person wearing it
- maintained, repaired or replaced so it continues to minimise the risk
- used or worn by the worker, so far as is reasonably practicable.

**R. 46:** A worker must, so far as reasonably able, wear the PPE in accordance with any information, training or reasonable instruction.

Personal hearing protectors, such as ear-muffs or ear-plugs, should be used in the following circumstances:

- when the risks arising from exposure to noise cannot be eliminated or minimised by other more effective control measures,
- as an interim measure until other control measures are implemented
- where extra protection is needed above what has been achieved using other noise control measures.

If the use of personal hearing protectors is necessary, it is important that the hearing protectors are worn throughout the period of exposure to noise. Removing personal hearing protectors for even short periods significantly reduces the effective attenuation (noise reduction) and might provide inadequate protection. For example, a worker wearing a hearing protector for a full 8-hour day will receive the 30 dB maximum protection level. However, one hour without wearing the hearing protector causes the maximum protection level to fall to 9 dB.

Areas where people may be exposed to hazardous noise should be sign-posted as hearing protector areas and the boundaries of these areas should be clearly defined. Workers and other persons, including managers and visitors, should not enter these areas without wearing appropriate personal hearing protectors, regardless of how short the time they stay in the hearing protector area.

Where sign-posting is not practicable, you should make other arrangements to ensure that workers and others know when personal hearing protectors are required. For example:

- attach prominent warning notices to tools and equipment indicating that personal hearing protectors should be worn when operating them
- provide written and verbal instructions on how to recognise circumstances in which personal hearing protectors are needed
- ensure effective supervision of identified hazardous tasks.

Personal hearing protectors should be selected and maintained in accordance with AS/NZS 1269.3 *Occupational noise management – hearing protector program*. Involve your workers in the selection process and offer a reasonable choice from a range of types.

Suppliers of hearing protectors should provide the full information on the attenuation likely to be provided including the SLC80 ratings, class and octave band attenuation values. The attenuation values should be derived from attenuation measurements made in accordance with AS/NZS 1270 *Acoustics – hearing protectors*.

### Selection

When selecting personal hearing protectors you should consider:

- the degree of attenuation required in the worker's environment (see Table 4). Do not provide protectors that overprotect by cutting out too much sound – this can cause difficulties hearing verbal instructions and other sounds needed to work safely
- the suitability for the type of working environment and the work tasks. For example, ear-plugs are difficult to use hygienically for work that requires them to be inserted with dirty hands and in these circumstances, ear-muffs are more appropriate, but ear-muffs can be uncomfortable to wear in hot environments and can make it difficult for the wearer to enter a confined space or to wear a helmet
- the comfort, weight and clamping force of the personal hearing protector.

Measured exposure L <sub>Aeq,8h</sub> dB(A)	Class
Less than 90	1
90 to less than 95	2
95 to less than 100	3
100 to less than 105	4
105 to less than 110	5

Individual fit of personal hearing protectors is critical for optimum protection. Several devices are available to assist with this. Wearing work equipment—such as hard hats, dust masks and eye protection—may affect the performance of the protector. The fit of hearing protectors should be checked while the user is wearing regular work equipment. Workers wearing spectacles should be fitted with hearing protectors while wearing the spectacles.

### Maintenance

Personal hearing protectors must be regularly inspected and maintained to ensure they remain in good, clean condition. The inspections should check that:

- ear-muff seals are undamaged
- the tension of headbands is not reduced
- there are no unofficial modifications
- compressible ear-plugs are soft, pliable and clean.

If disposable ear-plugs are used, they should only be worn once.

You must provide your workers with training, information and instruction in the proper use, fit, care and maintenance of personal hearing protectors. You should also:

- include the need to wear hearing protectors in your safety procedures
- place someone in charge of issuing and making sure replacements are readily available
- carry out spot checks to ensure that workers are wearing their hearing protectors when required and are using them correctly
- ensure all managers and supervisors set a good example and wear personal hearing protectors at all times when in hearing protector areas.

## 5.7 Audiometric testing

The hearing of workers exposed to noise can be monitored through regular audiometric examinations. Audiometric testing is an important part of managing the risks from noise exposure at the workplace. Starting the audiometric testing before people are exposed to hazardous noise

(such as new starters or those changing jobs) provides a baseline as a reference for future audiometric test results. To be effective, initial audiometric testing should be provided within three months of the worker commencing work with regular follow-up tests at least every two years. These should be undertaken well into the work shift so that any temporary hearing loss can be picked up.

More frequent audiometric testing (e.g. every six months) may be needed if exposures are at a high  $L_{Aeq,8h}$ , which is equal or greater than 100 dB(A).

Before introducing an audiometric testing program, you should consult with your workers and their health and safety representatives. It is important that your workers understand that the aim of the testing is to evaluate the effectiveness of control measures to protect their hearing.

Audiometric testing and assessment of audiograms should be carried out by competent persons in accordance with the procedures in AS/NZS 1269.4:2005 - *Occupational noise management - Auditory assessment*.

Workers should be given the results of audiometric testing accompanied by a written explanation of the meaning and implications. Only with the consent of the worker should you provide their results to other parties. Unidentifiable individual results and group data should be made available to health and safety representatives of the worker's work group.

The reasons for any changes in hearing levels over time should be thoroughly investigated. When temporary or permanent threshold shifts are revealed through audiometric assessments or a worker reports a recent diagnosis of tinnitus, you should review your control measures to determine whether more effective control measures can be implemented so that your workers do not have to rely on personal hearing protectors.

If the worker is to continue using personal hearing protectors, you should:

- verify that the nominal performance of the worker's personal hearing protector is adequate for the level of exposure to noise
- examine the protector carefully and ensure it is not damaged
- check the protector fits the worker closely with no leakage paths for noise
- ask the worker if they have any difficulty using the protector
- check the worker uses the protector correctly and consistently whilst performing their work.

If workers are found to have sufficient hearing loss to interfere with the safe performance of their work, all reasonably practicable steps should be taken to modify the work environment. This may include providing:

- volume control on equipment such as telephones
- acoustically treated meeting areas with low noise and low sound reflections
- supplementary visual warning signals
- alternative work for the worker if other measures do not remedy the situation.

Monitoring hearing with regular audiometric testing is recommended in situations where workers are exposed to:

- any of the ototoxic substances listed in Appendix A where the airborne exposure (without regard to respiratory protection worn) is greater than 50 per cent of the national exposure standard for the substance, regardless of the noise level
- ototoxic substances at any level and noise with  $L_{Aeq,8h}$  greater than 80 dB(A) or  $L_{c,peak}$  greater than 135 dB(C)
- hand-arm vibration at any level and noise with  $L_{Aeq,8h}$  greater than 80 dB(A) or  $L_{c,peak}$  greater than 135 dB(C).

## 5.8 Information, training and instruction

**S. 19:** A person conducting a business or undertaking must ensure, so far as is reasonably practicable, that information, training and instruction is provided to workers and others at the workplace to protect them from health and safety risks.

**R. 39:** The information, training and instruction must, so far as is reasonably practicable, be provided in a way that can be easily understood by any person to whom it is provided.

Training should be provided to:

- those workers who may be exposed to hazardous noise or other agents that may contribute to hearing loss
- their managers and supervisors
- workplace health and safety committees and health and safety representatives
- those responsible for the purchase of plant, noise control equipment, personal hearing protectors and for the design, scheduling, organisation and layout of work.

The contents of the training program should include:

- the health and safety responsibilities of each party at the workplace
- how hearing can be affected by exposure to noise
- the detrimental effects hearing loss and tinnitus have on the quality of life, both at work and socially
- the tasks at the workplace that have the potential to give rise to hearing loss and the likely noise exposure level
- how to use noise control measures
- how to select, fit, wear, maintain and store personal hearing protectors
- how to report defects in hearing protectors and noise control equipment or raise any concerns regarding hazardous noise
- the purpose and nature of audiometric testing.

## 5.9 Implementing and maintaining control measures

A noise management plan may help implement the chosen noise control measures effectively. It should identify what action needs to be taken, who will be responsible for taking the action and by when.

The plan should be based on the results of any noise assessment and should also include:

- measuring noise levels to confirm that control measures are achieving expected attenuation
- specifications for purchasing or hiring plant
- a description of any training and supervision that may be needed
- control measures for temporary work areas and situations
- timeframes for reviewing noise assessments and control measures.

**R. 37:** You must ensure that the control measures you implement remain effective. This includes checking that the control measures are suitable for the nature and duration of the work, are installed, maintained and used correctly.



## 6. How to review control measures

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Any noise control measures that are implemented must be reviewed, and if necessary revised, to make sure they work as planned and to maintain, so far as is reasonably practicable, a work environment that is without risks to health and safety.

**R. 38:** A person conducting a business or undertaking must review and as necessary revise noise control measures:

- when the control measure does not control the risk so far as is reasonably practicable
- before a change at the workplace that is likely to give rise to a new or different health and safety risk that the control measure may not effectively control
- if a new hazard or risk is identified
- if the results of consultation indicate that a review is necessary
- if a health and safety representative requests a review.

Control measures may be reviewed using the same methods as the initial hazard identification step.

Consult your workers and their health and safety representatives and consider the following:

- Are the control measures working effectively in both their design and operation?
- How accurate is the risk assessment process? Are all noisy activities being identified?
- Have new work methods or new plant made the work quieter?
- Has instruction and training provided to workers been successful?
- Have new requirements or information indicated that current controls are no longer the most effective?
- Is an alteration planned to any structure, plant or process that is likely to result in a worker being exposed to hazardous noise?
- Has an incident occurred as a result of a worker being exposed to hazardous noise?
- Have any audiometric tests revealed changes in hearing threshold levels?

You should decide on the time interval between noise assessments by consulting with your workers. Assessment should be repeated whenever there is:

- installation or removal of machinery or other noise sources likely to cause a significant change in noise levels
- a change in workload or equipment operating conditions likely to cause a significant change in noise levels or exposure times
- a change in building structure likely to affect noise levels
- a change to working arrangements affecting the length of time workers spend in noisy work areas.

If you design, manufacture or supply products used for work you should check that the product effectively eliminates or minimises exposure to noise by obtaining feedback from users. This can help in determining whether any improvements can be made.

# 7. Role of designers, manufacturers, suppliers and installers

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Eliminating noise in the early stages of product planning (at the source) is more effective and usually cheaper than making changes after noise hazards are introduced into the workplace.

## 7.1 Designers

Designers of plant or structures used for work must ensure so far as is reasonably practicable that the plant or structure is designed to be without risks to the health and safety of persons.

### ***Design of plant***

**R. 59:** A designer of plant must design the plant so that its noise emission is as low as reasonably practicable.

Designers must provide information on the noise emission values of the plant (for example, data on sound power level or sound pressure level), the operating conditions of the plant when the noise emission is measured and the methods used to measure the noise emission. They must also provide information on any conditions required for safe use.

This information must be provided to manufacturers, importers and suppliers.

If you design plant you should consider:

- preventing or reducing the impact between machine parts
- replacing metal parts with quieter plastic parts
- combining machine guards with acoustic treatment
- enclosing particularly noisy machine parts
- selecting power transmission which permits the quietest speed regulation; for example, rotation-speed-controlled electric motors
- isolating vibration-related noise sources within machines.

You should also design:

- good seals for doors for machines
- machines with effective cooling flanges that reduce the need for air jet cooling
- quieter types of fans or placing mufflers in the ducts of ventilation systems
- quiet electric motors and transmissions
- pipelines for low flow speeds (maximum 5m/sec.)
- ventilation ducts with fan inlet mufflers and other mufflers to prevent noise transfer in the duct between noisy and quiet rooms.

Methods of maintenance and servicing should be taken into account in noise control design.

### ***Design of buildings and structures***

Designers of buildings and structures must take noise control into account from the beginning of the planning process and minimise the noise transmitted through the structure to the lowest level that is reasonably practicable.<sup>2</sup>

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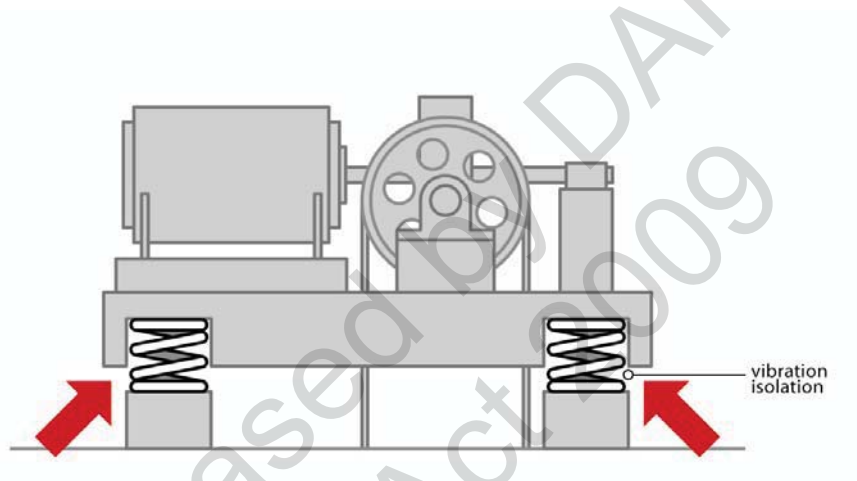
<sup>2</sup> Guidance for designers of buildings on recommended background sound levels (i.e. noise coming from outside the room or from building services) for different types of workplaces can be found in *AS/NZS 2107:2000 Acoustics – Recommended design sound levels and reverberation times for building interiors*.



For new buildings designers should consider:

- the effect on noise levels of building reverberation, the building layout and location of workstations relative to any plant
- selecting the frame, floor and machine bases so that all sources of disturbance can be provided with effective vibration isolation. Heavy, noisy equipment requires rigid, heavy bases. It is also possible to isolate machine bases from direct contact with the rest of the building frame (see Figure 2)
- isolating noise sources such as plant rooms
- designing acoustic treatments for noisy areas, for example, cover ceilings (and walls in the case of very high ceilings) with sound-absorbing material, use floating floors
- using flexible construction joints as building elements
- designing walls, floors, windows and doors to provide the necessary sound transmission loss
- covering floors of office areas with carpets.

**Figure 2:** The vibrations of an elevator drive are isolated from the building structure.



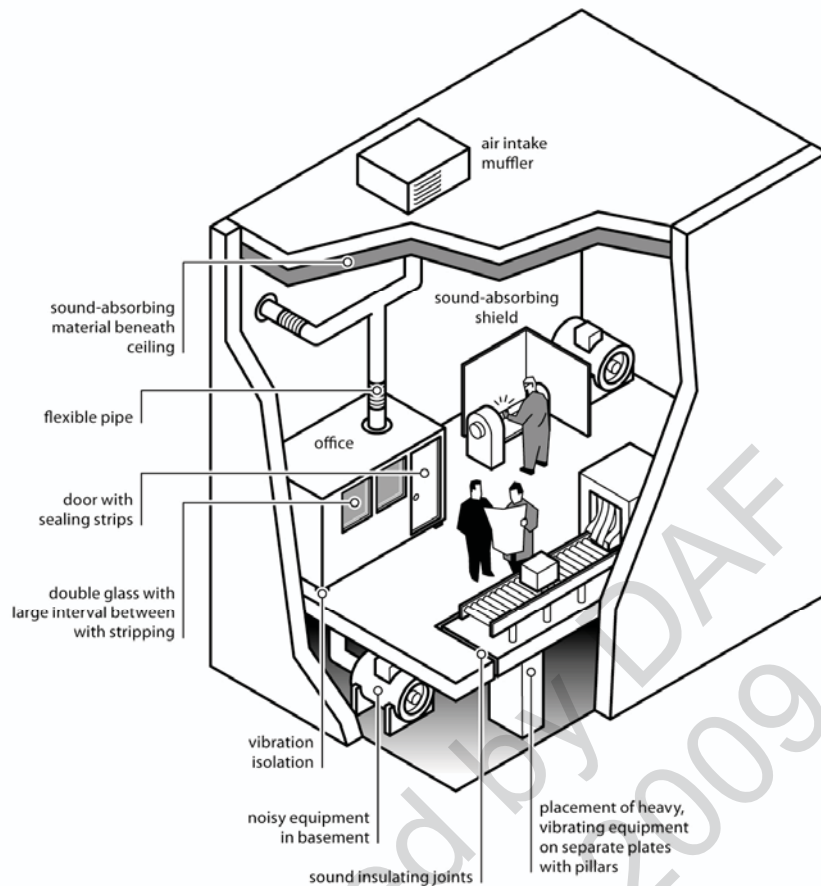
### **Sound insulating separate rooms**

With automation of processes, remote control from a separate room may be possible. Some control measures may include:

- designing control rooms with materials having adequate transmission loss
- providing good sealing around doors and windows
- providing openings for ventilation with passages for cables and piping equipped with good seals.

Control rooms should be adequately ventilated with air-conditioning in hot working areas. Otherwise, there is a risk that the doors will be opened for ventilation, which would spoil the effectiveness of the room in reducing the noise level.

**Figure 3:** Examples of noise control measures in an industrial building



## 7.2 Manufacturers

**R. 59:** A manufacturer of plant must manufacture the plant so that its noise emission is as low as reasonably practicable.

Manufacturers of plant or structures used for work must ensure, so far as is reasonably practicable, that the plant or structure is manufactured without risks to the health and safety of persons. If noise cannot be eliminated, manufacturers must ensure the plant is manufactured so that its noise emission is as low as reasonably practicable and that the manufacturing process does not introduce new or additional noise hazards.

Manufacturers should manufacture plant:

- using and testing the safety measures specified by the designer
- using materials and techniques that minimise the risk of hearing loss by reducing noise to the lowest level reasonably practicable.

Manufacturers must provide information to an importer or supplier on the noise emission values of the plant, the operating conditions of the plant when the noise emission is measured and the methods used to measure the noise emission. They must also provide information on any conditions required for safe use.

## 7.3 Suppliers and importers

Suppliers or importers must ensure so far as is reasonably practicable that the plant is without risks to the health and safety of persons at the time of supply.

Suppliers and importers must take all reasonable steps to obtain the information that the manufacturer is required to provide on noise emission values and provide it to any person to whom the plant is supplied.

Suppliers and importers should:

- provide all noise control measures with the product as per the setup recorded on the noise test results
- provide maintenance information to ensure safe use and operation.

## 7.4 Installers

Installers must ensure so far as is reasonably practicable that the plant or structure is installed in such a way that it is without risks to the health and safety of persons. For example, installers should ensure that the installation is undertaken according to the designer's specifications. Isolating vibrating sources of noise may involve installing large heavy machines on separate bases or in such a way that they do not directly contact the remainder of the building structure.

Installers should also provide information to potential users about the conditions required for safe use, including maintenance requirements.

## 7.5 What information should be provided to potential users?

Designers, manufacturers, suppliers and importers must give purchasers and other potential users the information they need to safely use the plant, including the results of any calculations, analysis or testing carried out.

Information must include the noise emission values of the plant, the operating conditions of the plant when the noise emission is measured and the methods used to measure the noise emission. This information will help purchasers choose plant with low noise levels.

The testing information that should be supplied to the purchaser is listed in Table 5. Where relevant information on test procedures is contained in a test standard or a test report, reference to the standard or the report should be included. Information should be provided on peak noise levels, where relevant, as well as on continuous noise levels.

Where there is a selection of noise measurement results available, the preferred measurement is the sound pressure level at the operator's position.

Instructions for safe use should be communicated in a way that can be easily understood by users.

**Table 5:** Minimum noise testing information

<b>Supplier's details</b>	For example, name, local address, telephone and/or facsimile number , email
<b>Manufacturer's details</b>	For example, name, address, telephone and/or facsimile number ,email
<b>Details of the plant tested</b>	Including any noise controls, for example, make, model, serial number, relevant capacity/rating
<b>Title or number of specific test standard or code followed</b>	Including details of any departures from the standard. For example, if a machine needed to be mounted differently to the method given in the standard, the alternative mounting should be described
<b>Details of operating conditions</b>	If not specified in the standard, or if no specific test standard is available for the type of plant being tested. For example, test machine load, speed, type of material processed, details of installation and mounting of test machine, details of test environment, description of measurement instrumentation and procedure. Reference to a test report containing this information will suffice
<b>Measurement position(s)</b>	For example, operator's ear or 1 metre from machines
<b>Index measured</b>	For example, sound pressure level or sound power level
<b>Frequency weighting</b>	For example, A, C or linear
<b>Time weighting</b>	For example, slow, fast or peak, or <b>Leq</b>
<b>Sound level or levels determined in testing.</b>	
<b>Units of measurement</b>	For example, dB re: 20 micropascals
<b>Details of tester</b>	For example, name, address, telephone and/or facsimile number ,email, accreditation
<b>Date issued</b>	

# Appendix A – Other causes of hearing loss in the workplace

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## Vibration

Studies have indicated that there is a link between exposure to hand-arm vibration and hearing loss. Workers who use equipment such as chainsaws that subject the worker to both hand-arm vibrations and to noise may be more likely to suffer from hearing loss. Tools that may expose workers to both noise and hand-arm vibration include:

- pneumatic and electrical rotary tools such as concrete breakers, grinders, sanders and drills
- percussive tools such as chippers and riveters
- petrol-powered tools such as lawn-mowers, brush-cutters and chainsaws.

Control measures to reduce exposure to hand-arm vibration may involve finding alternative ways to do the work that eliminates the need to use vibrating equipment or to purchase tools that produce less vibration.

## Ototoxic substances

Exposure to some chemicals can result in hearing loss. These chemicals are known as ototoxic substances. Hearing loss is more likely to occur if a worker is exposed to both noise and ototoxic substances than if exposure is just to noise or ototoxic substances alone.

There are three major classes of ototoxic substances: solvents, heavy metals and asphyxiants. Work activities that commonly combine noise and ototoxic substances include:

- painting
- printing
- boat building
- construction
- furniture making
- fuelling vehicles and aircraft
- manufacturing, particularly of metal, leather and petroleum products
- degreasing
- fire-fighting
- weapons firing

Some medications have also been identified as ototoxic substances. These include some anti-cancer, anti-inflammatory, anti-thrombotic, anti-malarial, anti-rheumatic and antibiotic drugs. Quinine and salicylic acids (such as aspirin) are also considered to be ototoxic substances.

Table A1 below lists those ototoxic substances most commonly used in workplaces. Some of these can be absorbed through the skin and are considered particularly hazardous.

Exposure standards for chemicals and noise have not yet been altered to take account of increased risk to hearing. Until revised standards are established, it is recommended that the daily noise exposure of workers exposed to any of the substances listed in Table A1 be reduced to 80 dB(A) or below. They should also undergo audiometric testing and be given information on ototoxic substances.

Control measures such as substitution, isolation and local ventilation should be implemented to eliminate or reduce chemical exposures. Personal protective equipment should be used to prevent skin and respiratory absorption when other controls are insufficient.

Table A1: Some common ototoxic substances <sup>3</sup>		
Type	Name	Skin Absorption
Solvents	Butanol	√
	Carbon disulphide	√
	Ethanol	
	Ethyl benzene	
	n-heptane	
	n-hexane	
	Perchloroethylene	
	Solvent mixtures and fuels Stoddard solvent (white spirits)	√
	Styrene	
	Toluene	√
	Trichloroethylene	√
	Xylenes	
Metals	Arsenic	
	Lead	
	Manganese	
	Mercury	√
	Organic tin	√
Others	Acrylonitrile	√
	Carbon monoxide	
	Hydrogen cyanide	√
	Organophosphates	√
	Paraquat	

## Acoustic Shock

Acoustic incidents are sudden, unexpected loud noises occurring during telephone headset use, including crackles, hisses, whistles, shrieks or high-pitched noises. Acoustic shock is not caused by the loudness of a telephone, as all phone noise is electronically limited to a peak noise level of 123 decibels, but by a sudden rise in noise levels.

The noises can come from a wide variety of sources, either within the transmission system or from the customer end. Sources of acoustic incidents include those outlined in Table A2:

<sup>3</sup> Morata T.C. (2007) Promoting hearing health and the combined risk of noise-induced hearing loss and ototoxicity, *Audiological Medicine*, Vol.5, Issue 1, pp33-40.

<b>Table A2: Sources of acoustic incidents</b>	
<b>Sources within the transmission system</b>	<b>Sources from the customer end</b>
<ul style="list-style-type: none"> <li>▪ faulty or damaged networks, telephones and headset equipment</li> <li>▪ broadband and narrowband interference</li> <li>▪ mobile phones or fax machines used in call centres</li> </ul>	<ul style="list-style-type: none"> <li>▪ feedback oscillation from some cordless phones</li> <li>▪ alarm signals</li> <li>▪ phone receivers slammed down or dropped</li> <li>▪ tones from misdirected facsimiles and modems</li> <li>▪ noises made close to the receiver (eg. whistling)</li> </ul>

Although acoustic incidents occur in workplaces (mainly call centres), only a very small proportion cause the symptoms known as ‘acoustic shock’ in workers.

High background noise levels at the workplace can increase the risk of acoustic shock occurring from an acoustic incident. For example, operators may raise the volume in their headsets to improve hearing thereby increasing the impact of any sudden, loud telephone noise. When an acoustic incident occurs, the operator’s automatic reaction may be to remove the headset or receiver as quickly as possible and, in some cases, this may help prevent or reduce the effects of acoustic shock.

Other factors, such as a middle ear inflammation and feelings of tension, may increase the likelihood of an acoustic shock resulting from an acoustic incident.

### **Acoustic shock symptoms**

The effect on individuals can vary greatly for the same increase in sound level. Only a small number of people develop symptoms from an acoustic incident. Why a person experiences symptoms after an acoustic incident is not known with certainty and is still being researched.

Some researchers believe that a combination of stress and sudden loud noise causes excessive contraction of the middle ear muscles, triggering the acoustic shock symptoms.

Audiologists have grouped symptoms into three categories:

- Primary (immediate) symptoms, which include but are not limited to:
  - a feeling of fullness in the ear
  - burning sensations or sharp pain around or in the ear
  - numbness, tingling or soreness down the side of face, neck or shoulder
  - nausea or vomiting
  - dizziness
  - tinnitus and other head noises such as eardrum fluttering.
- Secondary symptoms, which include but are not limited to:
  - headaches
  - fatigue
  - a feeling of being off-balance
  - anxiety
- Tertiary symptoms, which include but are not limited to:
  - hypersensitivity (sensitivity to previously tolerated sounds such as loud voices, television and radio)
  - hyper vigilance i.e. being overly alert.

People experiencing such symptoms will respond in different ways. As with other workplace injuries and ill health, some may experience further effects, including anger, anxiety, social isolation and other psychological problems.

Few people suffer hearing loss from acoustic shock. To assist in the diagnosis where this may occur, consideration should be given to baseline audiometric testing of all operators’ hearing by a specialist when they commence work to establish their baseline hearing ability.



## **Control measures**

Control measures to eliminate or minimise the risk of acoustic shock include:

- providing high quality headsets with acoustic shock protection devices
- giving prompt attention to damaged equipment and network faults – the equipment or network supplier or an acoustic specialist should be contacted if necessary
- ensuring the proper fitting, use and maintenance of headsets
- reducing background noise in the room
- providing information and training on how to detect warning sounds for example, cordless phones being used too close to the base station at the customer end. Training on warning sounds should also prepare operators to know when to remove headsets as quickly as possible, where necessary
- with hotdesking work, ensuring workers turn the headset volume down as soon as possible after a changeover
- considering work organisation issues, such as unreasonable or unrealistic performance pressures or demands, which may cause tension and distress
- preventing mobile phones from being used in call centres.

## **Control of background noise in call centres**

Possible control measures to implement include:

- reviewing the design and layout of the room and workstations:
  - reducing external and building service noise
  - reducing reverberation within the room by using sound absorbing materials
  - placing acoustic barriers around/between workstations and other call centre areas
- encouraging people to not talk loudly or hold discussions near operators
- locating fax machines, photocopiers and printers away from operators
- controlling radio noise and use of mobile telephones
- with hotdesking, ensuring changeovers are smoothly managed and quiet
- providing sufficient room for workers to move around at changeover times without crowding.

## **Managing acoustic incidents**

After an acoustic incident, the worker should:

- remove the headset immediately
- in some circumstances, move to the 'break out' area
- report the incident and any symptoms to the supervisor
- discuss with the supervisor their ability to continue work and, where appropriate, relocate to another workstation.

After an acoustic incident, you should:

- ensure the event is recorded and logged
- discuss the incident and ability to continue work with the worker
- where symptoms are persistent or severe, refer the worker to a general practitioner and/or an audiologist for assessment and treatment of possible injury
- enquire into the cause of the noise, including whether it is from an internal or external source
- ensure the headset and other equipment is checked for clarity of sound and possible damage and faults
- remove damaged or faulty equipment from service
- review the adequacy of the noise control measures and general working environment.

# Appendix B – Noise hazard identification checklist

Description of work location: \_\_\_\_\_

Activities at workstation: \_\_\_\_\_

Assessed by: \_\_\_\_\_

Date: \_\_\_\_\_

'Yes' to any of the following indicates the need to carry out a noise assessment if exposure to the noise cannot be immediately controlled.

Hazard identification questions	Yes	No
1. Is a raised voice needed to communicate with someone about one metre away?	<input type="checkbox"/>	<input type="checkbox"/>
2. Do your workers notice a reduction in hearing over the course of the day? (This may only become noticeable after work, for example, needing to turn up the radio on the way home)	<input type="checkbox"/>	<input type="checkbox"/>
3. Are your workers using noisy powered tools or machinery?	<input type="checkbox"/>	<input type="checkbox"/>
4. Are there noises due to impacts (such as hammering, pneumatic impact tools) or explosive sources (such as explosive powered tools, detonators)?	<input type="checkbox"/>	<input type="checkbox"/>
5. Are personal hearing protectors used for some work?	<input type="checkbox"/>	<input type="checkbox"/>
6. Do your workers complain that there is too much noise or that they can't clearly hear instructions or warning signals?	<input type="checkbox"/>	<input type="checkbox"/>
7. Do your workers experience ringing in the ears or a noise sounding different in each ear?	<input type="checkbox"/>	<input type="checkbox"/>
8. Do any long-term workers appear to be hard of hearing?	<input type="checkbox"/>	<input type="checkbox"/>
9. Have there been any workers' compensation claims for noise-induced hearing loss?	<input type="checkbox"/>	<input type="checkbox"/>
10. Does any equipment have manufacturer's information (including labels) indicating noise levels equal or greater than any of the following:		
(a) 80 dB(A) $L_{Aeq,T}$ (T= time period over which noise is measured)?	<input type="checkbox"/>	<input type="checkbox"/>
(b) 130 dB(C) peak noise level?	<input type="checkbox"/>	<input type="checkbox"/>
(c) 88 dB(A) sound power level?	<input type="checkbox"/>	<input type="checkbox"/>
11. Do the results of audiometry tests indicate that past or present workers have hearing loss?	<input type="checkbox"/>	<input type="checkbox"/>
13. Are any workers exposed to noise and ototoxins in the workplace?	<input type="checkbox"/>	<input type="checkbox"/>
14. Are any workers exposed to noise and hand-arm vibration?	<input type="checkbox"/>	<input type="checkbox"/>

## Appendix C – Ready reckoner

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Tables C1 to C3 provide a simple way of working out a worker's  $L_{Aeq,8h}$  (eight-hour equivalent continuous sound pressure level) if you know the noise level and duration of each of the noisy tasks carried out by the worker during the work shift.<sup>4</sup>

From Tables C1 or C2 you read off the number of “noise exposure points” that correspond to a particular task's noise level and exposure duration. Table C1 is for noise levels between 75 and 105 dB(A) and Table C2 is for higher noise levels between 95 and 125 dB(A).

For example, a task producing a noise level at the worker's ear of 93 dB(A) that is done for two lots of 30 minutes in a shift (i.e. one hour total) produces 80 noise exposure points. Another task with a noise level of 120 dB(A) for one minute during the shift produces 670 points.

These points can be added (in the normal arithmetic way) to give the total exposure points for the shift. Table C3 is then used to convert the total points to the  $L_{Aeq,8h}$ .

In the example above, if these were the only noisy tasks carried out by the worker, the points total is 750 and (from Table C3, rounding to the nearest whole decibel) the  $L_{Aeq,8h}$  for the worker is 94 dB(A).

This calculated  $L_{Aeq,8h}$  value can be compared with the exposure standard for noise i.e.  $L_{Aeq,8h} = 85$  dB(A). Additionally, noise exposure points can be used to prioritise the noise control program by showing which tasks make the greatest contribution to the total noise exposure.

In the example above the worker's  $L_{Aeq,8h}$  is greater than the standard, so noise control action is needed. Although it only lasts for one minute, the 120 dB(A) task contributes more than eight times as much as the other task to the total exposure and so should be the first one tackled.

In this scheme the exposure standard for noise –  $L_{Aeq,8h} = 85$  dB(A) – is 100 points.

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<sup>4</sup> Based on Health and Safety Executive UK guidance material with the points used in the tables derived from procedures in AS/NZS1269.1

Table C1: Exposure points for 75-105 dB(A)/15minutes – 12 hours

Sound Level L <sub>Aeq,T</sub> dB(A)	Duration of exposure per shift							
	15 min	30 min	1 h	2 h	4 h	8 h	10 h*	12 h*
105	320	640	1270	2530	5060	10120	12650	15180
104	250	500	1000	2010	4020	8040	10050	12060
103	200	400	800	1600	3200	6400	8000	9600
102	160	320	640	1270	2540	5070	6340	7600
101	130	250	500	1010	2010	4030	5040	6040
100	100	200	400	800	1600	3200	4000	4800
99	80	160	320	640	1270	2540	3180	3810
98	63	130	250	500	1010	2020	2520	3030
97	50	100	200	400	800	1600	2000	2410
96	40	80	160	320	640	1270	1590	1910
95	32	63	130	250	510	1010	1260	1520
94	25	50	100	200	400	800	1000	1210
93	20	40	80	160	320	640	800	960
92	16	32	63	130	250	510	630	760
91	13	25	50	100	200	400	500	600
90	10	20	40	80	160	320	400	480
89	7.9	16	32	64	130	250	320	380
88	6.3	13	25	50	100	200	250	300
87	5.0	10	20	40	80	160	200	240
86	4.0	8.0	16	32	64	130	160	190
85	3.2	6.3	13	25	50	100	130	150
84	2.5	5.0	10	20	40	80	100	120
83	2.0	4.0	8.0	16	32	64	80	96
82	1.6	3.2	6.3	13	25	51	63	76
81	1.3	2.5	5.0	10	20	40	50	60
80	1.0	2.0	4.0	8.0	16	32	40	48
79	0.8	1.6	3.2	6.4	13	25	32	38
78	0.6	1.3	2.5	5.0	10	20	25	30
77	0.5	1.0	2.0	4.0	8.0	16	20	24
76	0.4	0.8	1.6	3.2	6.4	13	16	19
75	0.3	0.6	1.3	2.5	5.1	10	13	15

Table C2: Exposure points for 95-125 dB(A)/5 seconds – 10 minutes

Sound Level L <sub>Aeq,T</sub> dB(A)	Duration of exposure per shift							
	5 sec	10 sec	15 sec	30 sec	1 min	2 min	5 min	10 min
125	180	360	530	1050	2110	4220	10540	21080
124	140	280	420	840	1680	3350	8370	16750
123	110	220	330	670	1330	2660	6650	13300
122	90	180	260	530	1060	2110	5280	10570
121	70	140	210	420	840	1680	4200	8390
120	56	110	170	330	670	1330	3330	6670
119	44	88	130	270	530	1060	2650	5300
118	35	70	110	210	420	840	2100	4210
117	28	56	84	170	330	670	1670	3340
116	22	44	66	130	270	530	1330	2650
115	18	35	53	110	210	420	1050	2110
114	14	28	42	84	170	330	840	1680
113	11	22	33	67	130	270	670	1330
112	8.8	18	26	53	110	210	530	1060
111	7.0	14	21	42	84	170	420	840
110	5.6	11	17	33	67	130	330	670
109	4.4	8.8	13	26	53	110	270	530
108	3.5	7.0	11	21	42	84	210	420
107	2.8	5.6	8.4	17	33	67	170	330
106	2.2	4.4	6.6	13	27	53	130	270
105	1.8	3.5	5.3	11	21	42	110	210
104	1.4	2.8	4.2	8.4	17	33	84	170
103	1.1	2.2	3.3	6.7	13	27	67	130
102	0.9	1.8	2.6	5.3	11	21	53	110
101	0.7	1.4	2.1	4.2	8.4	17	42	84
100	0.6	1.1	1.7	3.3	6.7	13	33	67
99	0.5	0.9	1.3	2.7	5.3	11	27	53
98	0.4	0.7	1.1	2.1	4.2	8.4	21	42
97	0.3	0.6	0.8	1.7	3.3	6.7	17	33
96	0.2	0.5	0.7	1.3	2.7	5.3	13	27
95	0.2	0.4	0.5	1.1	2.1	4.2	11	21

Table C3: Conversion	
Total exposure points	L <sub>Aeq,8h</sub> dB(A)
32000	110
25420	109
20190	108
16040	107
12740	106
10120	105
8040	104
6400	103
5070	102
4030	101
3200	100
2540	99
2020	98
1600	97
1270	96
1010	95
800	94
640	93
510	92
400	91
320	90
250	89
200	88
160	87
130	86
100	85
80	84
64	83
51	82
40	81
32	80
25	79
20	78
16	77
13	76
10	75

**Notes:**

1. If there is only one source of noise exposure, a quick glance at the background colour of the table cell corresponding to the sound level and duration of exposure will tell you if the worker is:
  - (a) above the L<sub>Aeq,8h</sub> 85 dB(A) exposure standard - **Red**
  - (b) well below the L<sub>Aeq,8h</sub> 85 dB(A) standard - **Green**
  - (c) marginal (between L<sub>Aeq,8h</sub> 80 and 85 dB(A)) – **Yellow**
2. For durations of exposure not listed in the table, add together the points from two durations that together give the same duration. For example, for five hours at 95 dB(A), add together the points for four hours at 95 dB(A) and one hour at 95 dB(A), i.e. 510 + 130, giving a total of 640 points.
3. The tables can be extended to include both higher and lower sound levels. A change of 10 dB(A) results in a tenfold change in the points. For example, one hour exposure at 108 dB(A) will give 10 times the points for one hour at 98 dB(A), that is, 2500 points.
4. For shift lengths of 10 hours or more (\*), the adjustments listed in Table 3 should be added to the L<sub>Aeq,8h</sub> before comparing the result with the exposure standard for noise.

**Example:** Carpenter working a 10.5-hour shift using tools and machines listed below.

Machine/Process	Measured Sound Level $L_{Aeq,T}$ dB(A)	Duration per shift
Circular Saw – cutting hardwood	94	2 h
Planer – planing hardwood	100	3 h
Power Drill – drilling hardwood	87	4 h
Hammering nails into wood	98	10 min
Background	70	1 h 20 min

If you want to just quickly see if the carpenter is exposed above the  $L_{Aeq,8h} = 85$  dB(A) noise standard, look up points for 94 dB(A) and 2 h in Table C1. You will see that the cell is red, so you know without going any further that the carpenter is exposed to noise above the standard.

If you want to actually work out the carpenter's 8h-equivalent continuous noise level,  $L_{Aeq,8h}$ , then use Tables C1, C2 and C3 as below:

Machine/Process	Sound Level $L_{Aeq,T}$ dB(A)	Duration per shift	Points
Circular Saw – cutting hardwood	94	2 h	200
Planer – planing hardwood	100	3 h	2 h 800 1 h 400
Power Drill – drilling hardwood	87	4 h	80
Hammering nails into wood	98	10 min	42
Background	70	1 h 20 min	1 h 0.4 20 m 0.1
		<b>Total 10.5 h</b>	Total 1522.5

From Table C3:  $L_{Aeq,8h} = 97$  dB(A), but as the shift is 10.5 hours, an adjustment of +1 dB(A) is needed, hence the adjusted  $L_{Aeq,8h} = 98$  dB(A).



# Appendix D – Contents of a noise assessment report

Checklist: What should be included in a noise assessment report?	If present
<b>When</b>	
Date of Assessment	<input type="checkbox"/>
<b>Who</b>	
Name of Assessor	<input type="checkbox"/>
Information (background/qualifications) of assessor	<input type="checkbox"/>
<b>Equipment used</b>	
Type of equipment used to take measurements	<input type="checkbox"/>
Calibration details for equipment	<input type="checkbox"/>
<b>How the noise measurements were taken</b>	
Where measurements were taken (general area or operator ear position)	<input type="checkbox"/>
Period of time over which the measurements were taken	<input type="checkbox"/>
<b>What was assessed</b>	
The area, plant, process, activity and workers that were assessed	<input type="checkbox"/>
<b>Source of noise</b>	
The sources (plant/process/jobs) of the noise	<input type="checkbox"/>
Whether all the noise sources that may be operating at the time were taken into account	<input type="checkbox"/>
Whether there were any significant noise sources that were not operating during the assessment	<input type="checkbox"/>
<b>Systems of work</b>	
Brief description of the work activity (how it's done; plant/process/activity/operating conditions/duration of process etc)	<input type="checkbox"/>
Hours of workshift (eg 8-hour or 12-hour shift)	<input type="checkbox"/>
Whether assessment is for a normal/typical day or for a worst case scenario	<input type="checkbox"/>
<b>Results</b>	
The results of measurements in terms of levels and durations	<input type="checkbox"/>
Interpretation of the results, (i.e. compared to exposure standards; what do the results mean etc.; ranking of noise sources)	<input type="checkbox"/>
<b>Action Required</b>	
Any obvious noise controls that could be implemented, or the need for more detailed noise control study	<input type="checkbox"/>
<b>Other relevant factors</b>	
Information on and adequacy of any control measures already in place and hearing protectors used during the assessment	<input type="checkbox"/>
Where relevant, information about the environment (types of walls, surfaces, buildings, operational state of machinery, etc.)	<input type="checkbox"/>

# Appendix E – Engineering control measures

The following are 10 simple noise control techniques that have wide application across industry. In many cases they will produce substantial noise reductions quickly and cheaply, with little or no effect on normal operation or use of plant.<sup>5</sup>

## 1. Damping

**Typical applications** - Chutes, hoppers, machine guards, panels, conveyors, tanks

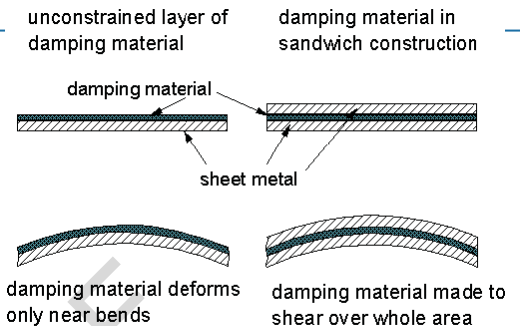
### Technique

There are 2 basic techniques:-

- unconstrained layer damping where a layer of bitumastic (or similar) high damping material is stuck to the surface
- constrained layer damping where a laminate is constructed

Constrained layer damping is more rugged and generally more effective. Either re-manufacture guards, panels or other components from commercially available sound deadened steel or buy self-adhesive steel sheet. The latter can simply be stuck on to existing components (inside or outside) covering about 80% of the flat surface area to give a 5 - 25 dB reduction in the noise radiated (use a thickness that is 40 per cent to 100 per cent of the thickness of the panel to be treated).

**Limitations:** the efficiency falls off for thicker sheets. Above about 3mm sheet thickness it becomes increasingly difficult to achieve a substantial noise reduction.



## 2. Fan installations

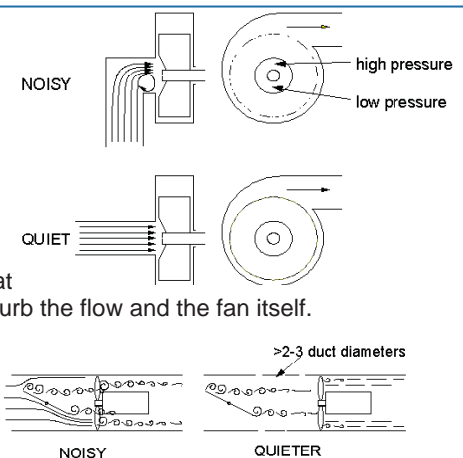
**Typical applications** - Axial flow or centrifugal fans.

### Technique

Maximum fan efficiency coincides with minimum noise. Any fan installation feature that tends to reduce fan efficiency is therefore likely to increase noise. Two of the most common examples are bends close to the fan (intake side in particular) and dampers close to the fan intake or exhaust.

Ideally, for maximum fan efficiency and minimum noise, make sure there is at least 2 - 3 duct diameters of straight duct between any feature that may disturb the flow and the fan itself.

Noise reductions of 3 -12 dB are often possible.



## 3. Ductwork

**Typical applications** - Extraction, ventilation, cooling, openings in walls and enclosures.

### Technique

Instead of fitting silencers, it is often possible to achieve a 10 - 20 dB reduction in airborne noise from a duct or opening by lining the last bend in the ductwork with acoustic absorbent (foam or rockwool / fibreglass). Alternatively, construct a simple absorbent lined right-angled bend to fit on the opening. Ideally, either side of the bend should be lined along a length equivalent to twice the duct diameter. Where flow velocities are high (> 3m/s), consider using cloth faced absorbent. Duct vibration can usually be treated by damping (as above).

<sup>5</sup> Source Health and Safety Executive UK

## 4. Fan speed

**Typical applications** - Axial or centrifugal flow fans.

### Technique

Fan noise is roughly proportional to the 5th power of fan speed. So in many cases it is possible to achieve a large noise reduction from a small drop in fan speed by changing control systems or pulley sizes and re-setting dampers. The following table provides a guide to the trade-off that can be expected.

FAN SPEED REDUCTION	NOISE REDUCTION
10%	2 dB
20%	5 dB
30%	8 dB
40%	11 dB
50%	15 dB

## 5. Pneumatic exhausts

### Technique

Almost invariably it is possible to reduce pneumatic exhaust noise permanently by 10 - 30 dB by fitting effective silencers. The following are the practical points that can make the difference between success and failure:-

- *back pressure* : fit a larger coupling and silencer
- *clogging* : fit a straight-through silencer that cannot clog (and has no back pressure)
- *multiple exhausts* : manifold them into a single, larger diameter pipe fitted with the rear silencer from virtually any make of car (from your local tyre and exhaust fitter). Typically 25 dB reduction.

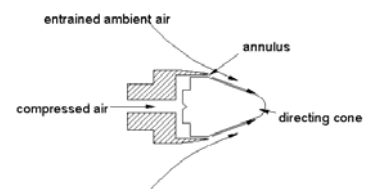
**Note** : a well designed silencer will not increase system back pressure.

## 6. Pneumatic nozzles

**Typical applications** - Cooling, drying, blowing

### Technique

In most cases, it is possible to replace existing nozzles (usually simple copper pipe outlets) for quiet, high efficiency units. These not only reduce noise levels by up to 10 dB, but also use less compressed air. The types of nozzle to look out for are entraining units (schematic at right) from various manufacturers and in a variety of sizes.

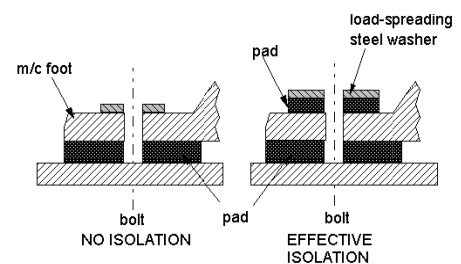


## 7. Vibration isolation pads

**Typical applications** - Machine feet, pumps, mezzanine installations

### Technique

Mounting motors, pumps, gearboxes and other items of plant on rubber bonded cork (or similar) pads can be a very effective way of reducing transmission of vibration and therefore noise radiated by the rest of the structure. This is particularly the case where vibrating units are bolted to steel supports or floors. However, a common error with the use of these pads is for the bolt to "short-circuit" the pad, resulting in no isolation. Additional pads should be fitted under the bolt heads as shown.



There are many types of off-the-shelf anti-vibration mounts available, for instance rubber/neoprene or spring types. The type of isolator that is most appropriate will depend on, among other factors, the mass of the plant and the frequency of vibration to be isolated. Any supplier of anti-vibration mounts will be able to advise you on this.

## 8. Existing machine guards

### Technique

The existing guards on many machines can often be improved to provide a significant noise reduction. The two principles involved, which must be used in combination, are:-

(i) *Minimise gaps*

Reducing by half the "gap" open area in a set of guards can reduce the noise by 3 dB. If you can reduce the openings (flexible seals, additional close fitting panels etc) by 90 per cent, then a 10 dB noise reduction is possible.

(ii) *Acoustic absorbent*

Lining a significant proportion of the inside of the guards with acoustic absorbent (foam, rockwool / fibreglass) will reduce the noise "trapped" by the guards.

Consequently, less noise will escape through any gaps. Failure to line the inside of the guards could result in an increase in noise at the operator's position if the gaps have been minimised as in (i) above.

In most cases, both sets of modifications can be tested in mock-up form using cardboard (and wide tape) to extend the guarding and temporarily fitting areas of acoustic foam inside. Not only does this process help with the practical aspects (access, visibility etc), but it usually also provides a very good indication of the noise reduction that can be expected. Guard vibration radiated as noise can also be treated via damping (as above).

## 9. Chain and timing belt drives

### Technique

Noisy chain drives can often be replaced directly with quieter timing belts. Within the range of timing belts available, there are also quiet designs that use different tooth profiles to minimise noise. There is also a new design of belt for applications where noise is critical which uses a chevron tooth pattern to provide very quiet running. Noise reductions in the range of 6 - 20 dB are often possible using this approach.

## 10. Electric motors

### Technique

Most companies have large numbers of electric motors used on anything from fans to pumps to machine tools. However, it is not very common knowledge that general duty motors are available (at little or no cost premium) that are up to 10 dB(A) or more quieter than typical units as direct replacements. The best approach is to feed these motors into the system over a period of time so that all replacement motors are quiet motors.

# Personal Protective Equipment – Biosecurity & WHS considerations

Department of Agriculture, Fisheries and Forestry

## 1. PURPOSE

The purpose of this procedure is to provide general information on and guidance for the selection, use, maintenance and storage of personal protective equipment (PPE) during normal Biosecurity Queensland operations and responses to pest / disease infestations, outbreaks or incursions (e.g. of an emergency animal or plant disease).

PPE may be worn for biosecurity reasons (i.e. to prevent the spread of the pest or disease), for hygiene reasons, and / or for workplace health and safety reasons (i.e. prevent workers being exposed to the hazard or disease, e.g. chemicals, zoonotic diseases)

## 2. SCOPE

The procedure applies to all Biosecurity Queensland (BQ) workers and to workplaces where Biosecurity Queensland is:

- carrying out normal operational activities, or
- carrying out activities as part of a response to pest / disease incursions, and / or
- working in collaboration with internal and external stakeholders, e.g. property owners.

## 3. DEFINITIONS

<b>DAFF</b>	Department of Agriculture, Fisheries and Forestry
<b>Disease</b>	A pathological condition of an organism (plant or animal) that causes impaired function.  For further definition of biosecurity related diseases, relevant legislation and emergency response plans should be consulted. (e.g. <i>Stock Act 1915, Exotic Diseases in Animal Act 1981, Plant Protection Act 1989, AUSVETPLAN, PLANTPLAN</i> )
<b>Hazard</b>	Something that has the potential to cause injury, illness or harm.
<b>Hazardous materials</b>	Chemicals, biological/infectious substances, radioactive materials.
<b>Normal operations</b>	Includes all activities conducted by Biosecurity Queensland workers during the course of their everyday work activities. e.g. sampling, surveillance, auditing, investigations, treating and clearing cattle, necropsy, controlling invasive plants, preparing and laying baits, science and laboratory activities.
<b>Personal protective equipment (PPE)</b>	Clothing, equipment and/or substances (e.g. sunscreen) worn or used by a person to protect part or all of the body from risks of injury or disease.  PPE includes protective clothing, protective footwear, hand and arm protection, eye and face protection, respiratory protection, hearing protection, and head protection.

<b>Pest</b>	<p>For the purposes of this document:</p> <ul style="list-style-type: none"> <li>• Any species, biotype or strain of invertebrate pest or pathogen injurious to plants or plant health.</li> <li>• Any declared animal or plant</li> </ul> <p>For further definition of biosecurity related pests, relevant legislation and emergency response plans should be consulted. (e.g. <i>Plant Protection Act 1989</i>, PLANTPLAN, <i>Land Protection (Pest and Stock Route Management) Act 2002</i>)</p>
<b>PAPR</b>	Powered Air-Purifying Respirator
<b>Reasonably practicable</b>	<p>Reasonably able to be done taking into account:</p> <ul style="list-style-type: none"> <li>• the likelihood of the hazard or risk occurring, and</li> <li>• the degree of harm that might result, and</li> <li>• what is known about the hazard or risk and the ways of eliminating or minimising the risk, and</li> <li>• the availability or suitability of ways to eliminate or minimise the risk, and</li> <li>• the cost associated with the ways of eliminating or minimising the risk, including whether the cost is grossly disproportionate to the risk.</li> </ul>
<b>Risk</b>	The likelihood that injury, illness or death might result from exposure to the hazard.
<b>WHS</b>	Workplace health and safety
<b>Worker</b>	<p>A person who carries out work in any capacity for the person undertaking the business, e.g. DAFF.</p> <p>“Worker” includes employees, contractors, subcontractors, outworkers, apprentices and trainees, work experience students, volunteers and individuals (including self-employed persons) if they perform work for the business.</p> <p><i>Note: If DAFF asks any person to undertake specific tasks, e.g. obtaining temperature data or conducting visual observations of horses, that person would be regarded as a ‘worker’.</i></p>
<b>Workplace</b>	A place where work is carried out for a business and includes any place where a worker goes, or is likely to be, while at work.
<b>Zoonotic</b>	Of or relating to or constituting a zoonosis (a disease of animals that can be transmitted to humans)



## 4. RESPONSIBILITIES AND ACCOUNTABILITIES

### 4.1 DAFF has a duty of care under the WHS Act 2011 and Regulation 2011 to:

- ensure the health and safety of its workers and other persons at the workplace is not put at risk from the work it carries out
- to eliminate or minimise risks to health and safety as far as is reasonably practicable
- provide PPE if it is determined that it is to be used to minimise the risk to health and safety at the workplace
- ensure that the PPE provided for use at the workplace is:
  - suitable for the nature of the work and any associated hazards
  - suitable size, fit and comfort for the person who is to wear it
  - maintained, repaired or replaced to ensure that it continues to minimise risk to the person, and
  - used or worn by the worker or other person correctly and so far as is reasonably practicable
- provide adequate and appropriate information and instruction in the proper use, wearing, storage and maintenance of PPE
- ensure that PPE provided to its workers by another person conducting a business or undertaking is appropriate and without risk.

### 4.2 Executive management is responsible for:

- exercising due diligence in relation to health and safety
- taking effective action to ensure that a healthy and safe working environment is provided and that safe working procedures are implemented and followed
- providing appropriate resources regarding health and safety in the workplace, including financial provisions for the purchase of PPE, its ongoing maintenance and replacement, and the training of workers
- ensuring that the requirements and effectiveness of this procedure are monitored and evaluated

### 4.3 Supervisors / line managers are responsible for:

- Ensuring risk assessments are completed on work tasks to determine appropriate control measures including PPE requirements, and that these risk assessments are regularly reviewed.
- Ensuring that when PPE has been identified as a control measure that a PPE plan is developed and periodically assessed to ensure effectiveness.
- Ensuring PPE and general safety requirements are incorporated into written procedures.
- Ensuring adequate supplies of appropriate PPE are available and readily accessible, and that the PPE is used, maintained and stored correctly.

- Ensuring workers receive appropriate training in the correct selection, use, maintenance, storage and disposal of PPE.
- Ensuring disposal facilities / procedures are in place so that used PPE is disposed of appropriately.
- Obtaining professional advice where necessary to identify suitable PPE, and to provide appropriate training
- Consulting with workers regarding PPE
- Ensuring that documented records applicable to this procedure are maintained, including risk assessments, maintenance records and details of training provided
- Supervising and ensuring the requirements of this procedure are followed
- Undertaking periodic inspections of PPE to monitor compliance with the requirements of this procedure
- Ensuring PPE complies with legislation, Codes of Practice, Australian Standards and other relevant standards regarding PPE.

#### **4.4 Workers are responsible for:**

- Using or wearing personal protective equipment in accordance with safe work procedures, information, training and reasonable instruction provided to them, as far as they are reasonably able
- Ensuring they have adequate quantities of appropriate PPE for the tasks they are to perform
- Not intentionally misusing or damaging the PPE
- Cleaning, maintaining and storing PPE as per manufacturer's and/or workplace instructions
- Maintaining records (e.g. log book) of maintenance carried out on their PPE
- Reporting any damage to or defects of the PPE (e.g. failure of PPE), any loss of PPE, and any incidents relating to the use of the PPE.
- Advising their supervisor / manager of any issues which may affect their ability to use PPE (e.g. medical conditions).

#### **4.5 Other persons are responsible for:**

- Using or wearing the PPE provided at the workplace in accordance with any information, training or reasonable instruction provided by DAFF.

## 5.0 PROCESS

### 5.1 General WHS considerations

- PPE provides a barrier between the worker and the hazard (e.g. chemical, biological, zoonotic), rather than controlling the hazard at the source.
- PPE should only be used:
  - when there are no other practical higher level control measures available,
  - as a temporary or interim measure, or
  - in conjunction with other control measures.
- To ensure that the PPE will provide the level of protection it is designed to, it should:
  - be appropriate for the type of work,
  - be appropriate for the hazard and level of risk,
  - fit properly
  - be comfortable and easy to use
  - be used for the purpose for which it was designed, and as per manufacturer's instructions
  - not create additional health or safety risks, or interfere with any medical conditions of the user
  - be compatible with other PPE being used
  - be regularly inspected and checked prior to use
  - be regularly cleaned and maintained
  - be stored appropriately
- PPE can introduce other hazards and problems, which must be considered as part of the overall risk assessment of the task. Other hazards or problems may include:
  - increased heat load
  - added bulk and general discomfort
  - not being able to move freely
  - loss of dexterity
  - restricted vision and mobility
  - communication made more difficult
  - feelings of not being able to breathe easily, suffocation and/or claustrophobia
  - allergic reactions to the materials that the PPE is made of (e.g. latex gloves)
  - may 'spook' animals.
- Workers must be trained in the correct selection, use, maintenance, storage and disposal of PPE.
- Where there is a risk to persons who are not DAFF employees, action is to be taken to protect them from the hazard. This may include excluding the non-employee from the work area, or providing relevant PPE.
- Where PPE is provided to persons who are not DAFF employees, sufficient training, information and supervision is to be provided to ensure the PPE is being worn and used correctly.
- Where appropriate, signage should be displayed to remind workers of the PPE that is required to be worn in the work area.

- Further general information on the most common types of PPE is contained in Appendix 1: General Information on PPE.
- Specific information regarding the types of PPE available, and the correct selection, use, maintenance and storage of the PPE, should be sought from relevant Australian Standards and PPE suppliers.
- For further information regarding prevention and management of heat related illness (e.g. heat stress, heat stroke), refer to the Biosecurity Queensland Guideline [Prevention and Management of Heat Related Illness \(eDOCS 1182120\)](#).

## 5.2 Selecting & providing PPE

- A task analysis and risk assessment of the specific work activities must be undertaken to determine the appropriate control measures, including the type and level of PPE.
- The type and level of PPE required will depend on:
  - the nature of the hazards, pest or disease that workers may be exposed to,
  - how workers may come into contact or be exposed to the hazard, pest or disease,
  - the route of transmission of the organism if zoonotic,
  - the consequences and level of risk of that exposure, and
  - the reason for wearing PPE , i.e. for biosecurity, hygiene or workplace health and safety reasons.
- When selecting and providing protective equipment, the following aspects must be considered:
  - the parts of the body to be protected or covered
  - the type of hazard, pest / disease present, and the associated risks
  - the level of protection required
  - the type of work being undertaken
  - the level of mobility or dexterity required
  - the working environment
  - compatibility with other items of PPE
  - the ease of wearing (e.g. putting on, taking off, comfort, weight)
  - whether it fits properly, or is adjustable to ensure a good fit
  - whether it will create additional health or safety risks, or interfere with any medical conditions of the user
  - whether re-useable or disposable equipment is appropriate
  - communication and vision requirements
  - that the material that the protective equipment is made of will not be degraded or damaged by the hazard, pest or disease or the task being undertaken
  - the ease of cleaning and disinfection
  - the ease of maintenance and repair
  - storage requirements
  - the method of disposal.

- Adequate quantities and sizes of the required PPE are to be provided for use by workers and other persons.
- Workers are to be consulted with when selecting PPE and their individual characteristics and preferences considered.
- Ideally, a PPE Plan should be developed where a risk assessment has identified that PPE is to be used as a control measure. The PPE Plan should identify and record:
  - reasons for selecting each type of PPE
  - medical data (e.g. results of individual hearing tests prior to and during exposure to noise) that will help to evaluate the effectiveness of the PPE
  - training provided in relation to the PPE
  - requirements for fitting, cleaning, storage, maintenance and replacement of the PPE.
- The Plan should be periodically assessed to ensure the PPE remains effective.

### 5.3 Using PPE

- PPE is to be used only for the purpose for which it was designed, and as per manufacturer's instructions.
- PPE is to be checked before use, to ensure that it is clean and in good working condition (e.g. no cracks, splits, scratches, tears, holes) and within expiry dates (if applicable).
- Persons wearing or using PPE must be mindful of the limitations of the PPE (e.g. life of respirator filter, breakthrough time / permeability of gloves) and ensure that they replace the PPE before there is a risk to their health and safety.
- After use, reusable PPE is to be cleaned / decontaminated, and checked for damage. Items of PPE which are not reusable are to be disposed of appropriately.
- Damaged or defective PPE must be removed from use, repaired and/or discarded.
- Incidents relating to the failure or loss of or defect in or damage to PPE or other issues arising from the use of any PPE must be reported.
- Refer to relevant Australian Standards and/or Codes of Practice for more information on the correct use of PPE.

#### **5.4 Maintaining PPE**

- PPE is to be maintained to ensure its continued effectiveness.
- As part of a maintenance program, the following are to be identified and documented by supervisors / managers:
  - Maintenance duties and responsibilities
  - Cleaning procedures
  - Checking procedures
  - Storage procedures
  - Replacement criteria
- Records of the maintenance performed on the PPE are to be kept by workers using the PPE and their supervisors / managers, including:
  - Date of maintenance
  - Who performed the maintenance
  - Details of maintenance performed
  - Details of any damage or defects found,
  - Details of any parts replaced, including respirator filters.

#### **5.5 Storing PPE**

- When not in use, PPE is to be stored:
  - as per manufacturer's instructions
  - in a clean, hygienic and fully operational way
  - so that it remains clean and dry
  - so that it is safe from interference and damage, and
  - so that it is easily accessible when needed.
- Some PPE may have specific storage requirements, e.g. respirator filters need to be stored in sealed containers or bags.
- Respirator filters are to be regularly replaced in accordance with manufacturer's instructions.
- PPE is to be checked regularly during storage to ensure that it is in good workable condition, and has not deteriorated or been damaged during storage. Any damaged or defective PPE is to be removed from service and tagged with a warning tag until it can be repaired, or immediately discarded.
- Refer to relevant Australian Standards and/or Codes of Practice for more information on the correct maintenance and storage of PPE.

#### **5.6 PPE for hygiene or biosecurity reasons**

- PPE may be worn for hygiene reasons, i.e. to keep clothing clean when working in dirty environments or when carrying out activities which may result in soiling or contamination of personal clothing.



- PPE may also be worn to prevent animal or plant diseases or pests being spread from one property, or part thereof, to another.
- The type of PPE required will depend on the type of disease or pest, and how it could be spread, e.g. through soil / mud on shoes / clothes; seeds sticking to clothes; bacteria, viruses or mould spores adhering to clothes/ body.
- The PPE must be able to be decontaminated or disposed of before exiting the property or 'dirty' area / 'hot zone'.
- Further guidance regarding transmission routes and PPE requirements should be sourced from appropriate references, e.g. *AUSVETPLAN*, *PLANTPLAN*. These requirements should be included in work procedures and instructions.

### 5.7 PPE for health and safety reasons

- PPE may be used in conjunction with other control measures or where other control measures are not possible or reasonably practicable.
- The type and level of PPE required will depend on:
  - the nature of the hazards that workers may be exposed to, and
  - the route/s of exposure (i.e. how workers may come into contact or be exposed to the hazard), and / or
  - the mode of transmission of zoonotic agents.
- A task analysis and risk assessment of the specific activities must be undertaken to determine the appropriate type and level of PPE.
- PPE may be used to reduce the risk of injury from hazards including, but not limited to:
  - biological
  - chemical
  - cutting, sharp or protruding edges / objects
  - crush / collision
  - electrical
  - falling or moving objects
  - falling from heights
  - noise
  - projectiles or flying particles
  - radiation
  - thermal energy
  - temperature
  - vibration
- Refer to Appendix 2: Quick guide to PPE for various hazards, for general guidance. Further guidance should be sought from the relevant Australian Standards.
- Specific PPE requirements are to be written into safe work procedures specific for the task or activity, and workers trained in those procedures.

## 5.8 PPE for particular hazards

### Zoonotic diseases

- Workers may be exposed to zoonotic disease through contact with infectious blood and body fluids via:
  - direct contact or contact with contaminated items,
  - sharps injuries or animal bites,
  - splashes or droplets being deposited on the mucous membranes of the eyes, nose and mouth,
  - cuts, abrasions or broken skin, or
  - the inhalation of aerosols or contaminated dust.
- PPE required to be worn includes:
  - Gloves – disposable, e.g. nitrile. Two pairs of gloves are to be worn (i.e. hands are double-gloved).
  - Overalls with hood – disposable (e.g. splash-resistant or splash-proof) depending on level of contact with blood or body fluids
  - Gum boots – impervious rubber; must be able to be cleaned and disinfected
  - Face shield – if not using full-face respirator
  - Eye protection – safety glasses or goggles if not using full-face respirator,
  - Respiratory protection – disposable P2; or reusable half- or full-face respirators or PAPR, with appropriate filter canisters (particulate) fitted.
- A P2 particulate respirator is the minimum level of respiratory protection for exposure to bio-aerosols and dusts.
- Higher level (e.g. P3) respirators should be considered when there is likely to be exposure to significant amounts of infectious aerosols and dust.
- Disposable P2 particulate respirators, half face and full face respirators are only suitable for clean-shaven people as they depend on an effective seal with the skin of the face. People with beards are to wear Powered Air Purifying Respirators (PAPR).
- If respiratory protection is required, workers are to be fit-tested to ensure the mask fits correctly, and are to be trained in its correct fit, fit-checking procedures, use and maintenance.
- Refer to the [Respiratory Management Program \(eDocs 21555\)](#) and AS/NZS 1715 *Selection, use and maintenance of respiratory protective equipment* for further information regarding respiratory protection
- For information regarding correct procedures for donning and doffing (i.e. putting on and taking off) PPE when investigating or responding to a zoonotic disease, refer to the procedure [Zoonotic disease PPE and personal disinfection \(eDOCS 14494\)](#).

## Chemical / air-borne contaminants exposure

- Workers and others may be exposed to chemicals and air-borne contaminants through:
  - Inhalation of gases, fumes, vapours, mists, particles or dusts
  - Splashes of chemicals onto skin or into mucous membranes or eyes
  - Cuts, abrasions, broken skin or sharps protruding into the skin
  - Ingestion through swallowing dust or contaminated food (e.g. from poor hand hygiene)
- The degree of chemical resistance of the PPE to the particular chemical / airborne contaminant must be considered, along with factors such as the permeability and breakthrough limits e.g. of different glove materials.
- The type and level (e.g. disposable, P2, P3) of respiratory protection and the type of filter canister (e.g. particulate, organic vapours, inorganic or acid gases, methyl bromide) required will depend on the nature, toxicity, physical form and the concentration of the chemical / airborne contaminant.
- Guidance on the most appropriate type of PPE including respiratory protection to be worn when using / exposed to a particular chemical / airborne contaminant is to be sought from the chemical's Safety Data Sheet, PPE suppliers, *AS/NZS 1715 Selection, use and maintenance of respiratory protective equipment*, and the [Respiratory Management Program \(eDocs 21555\)](#) for further information regarding respiratory protection

## Dangerous atmospheres

- Atmospheres in which there are dangerous levels of toxic gases or insufficient oxygen present a risk of asphyxiation.
- Where there is a risk of asphyxiation, supplied-air or supplied oxygen breathing apparatus is to be used.
- Only workers who have been specifically trained in the use of this equipment and in entering these atmospheres are to work in these situations.
- Refer to the [Respiratory Management Program \(eDocs 21555\)](#) and *AS/NZS 1715 Selection, use and maintenance of respiratory protective equipment* for further information regarding respiratory protection.

## 6. TRAINING

- Supervisors / managers are to ensure workers are provided with initial and on-going training and information in regards to PPE, including:
  - choice and use of PPE for the task
  - correct fitting and use
  - the limitations and capabilities
  - cleaning, disinfection and maintenance
  - correct storage
  - determining when the PPE is not longer fit for purpose
  - obtaining replacements.

- Records of training must be kept and maintained by the supervisor / manager, as well as the training provider. The records must include:
  - the date of the training session
  - the details of the information presented
  - the name of the person who conducted the session
  - the names of persons who attend the session
  - the results of any assessments conducted

## 7. RECORDS

Records to be kept relating to this procedure include:

- Risk assessments
- PPE Plan
- PPE maintenance and replacement records
- Training records

## 8. MONITORING & EVALUATION

- The effectiveness of the PPE is to be monitored on an on-going basis.
- Compliance with the requirements of this procedure is to be determined by periodic inspections of PPE by supervisors / managers.
- Risk assessments on tasks which involve the use of PPE and the PPE Plan are to be periodically reviewed to determine that the PPE is appropriate and effective.

## 9. SOURCE DOCUMENTS

- Biosecurity Queensland, Australian Veterinary Association, Queensland Health & Workplace Health and Safety Queensland 2011 *Hendra Virus Infection Prevention Advice March 2011*, Queensland Government, Brisbane.
- Queensland Work Health and Safety Act 2011, [www.legislation.qld.gov.au/LEGISLTN/CURRENT/W/WorkHSA11.pdf](http://www.legislation.qld.gov.au/LEGISLTN/CURRENT/W/WorkHSA11.pdf)
- Queensland Work Health and Safety Regulation 2011. <http://www.legislation.qld.gov.au/LEGISLTN/CURRENT/W/WorkHSR11.pdf>
- Standards Australia / Standards New Zealand 1997, *Recommended practices for occupational eye protection*, AS/NZS 1336:1997, Standards Australia, Sydney.
- Standards Australia / Standards New Zealand 1998, *Occupational protective helmets – Selection, care and use*, AS/NZS 1800:1998, Standards Australia, Sydney.
- Standards Australia / Standards New Zealand 2000, *Occupational protective gloves. Part 1: Selection, use and maintenance*, AS/NZS 2161.1:2000, Standards Australia, Sydney.
- Standards Australia / Standards New Zealand 2005, *Safety in Laboratories Part 1: Planning & Operational aspects*, AS/NZS 2243.1:2005, Standards Australia, Sydney.

- Standards Australia / Standards New Zealand 2008, *Occupational protective clothing. Part 1: Guidelines on the selection, use, care and maintenance of protective clothing*, AS/NZS 4501.1:2008, Standards Australia, Sydney.
- Standards Australia / Standards New Zealand 2009, *Selection, use and maintenance of respiratory protective equipment*, AS/NZS 1715:2009, Standards Australia, Sydney.
- Standards Australia / Standards New Zealand 2010, *Safety, protective and occupational footwear, Part 1: Guide to selection, care and use*, AS/NZS 2210.1:2010, Standards Australia, Sydney.
- Swinburne University of Technology 2010, *Personal Protective Clothing and Equipment (PPE) Procedure*, <http://policies.swinburne.edu.au/ppdonline/showdoc.aspx?recnum=POL/2011/4>, downloaded 29/11/2011.
- The University of Western Australia 2010, *Personal Protective Equipment Guidelines*, [www.safety.uwa.edu.au/policies/personal\\_protective\\_equipment\\_guidelines](http://www.safety.uwa.edu.au/policies/personal_protective_equipment_guidelines), downloaded 29/11/2011.
- Workplace Health and Safety Queensland 2011, *How to Manage Health and Safety Risks Code of Practice 2011*, <http://www.deir.qld.gov.au/workplace/resources/pdfs/manage-whs-risks-cop-2011.pdf>
- Workplace Health and Safety Queensland 2011, *Personal Protective Equipment*, <http://www.deir.qld.gov.au/workplace/subjects/ppe/index.htm> downloaded 17 May 2012.
- Worksafe Western Australia 2002, *Code of Practice - Personal Protective Clothing and Equipment 2002*, Department of Consumer and Employment Protection, Perth.

## 10. RELATED DOCUMENTS

- Biosecurity Queensland 2010, *Respiratory Management Program – For zoonotic disease investigation and responses, chemical sprays, volatile or oxygen replacement gas exposures*, [eDOCS 21555](#).
- Biosecurity Queensland 2012, *Prevention and Management of Heat Related Illness*, [eDOCS 1182120](#).
- Department of Agriculture, Fisheries and Forestry 2012, Incident Report and Prevention Review Form, [http://intranet.daff.govnet.qld.gov.au/\\_data/assets/pdf\\_file/0004/9724/incident-and-prevention-review-report.pdf](http://intranet.daff.govnet.qld.gov.au/_data/assets/pdf_file/0004/9724/incident-and-prevention-review-report.pdf)
- Department of Agriculture, Fisheries and Forestry 2012, Workplace Health and Safety Policy, [http://intranet.daff.govnet.qld.gov.au/\\_data/assets/pdf\\_file/0019/9721/HR1311-workplace-health-safety-policy.pdf](http://intranet.daff.govnet.qld.gov.au/_data/assets/pdf_file/0019/9721/HR1311-workplace-health-safety-policy.pdf)
- Department of Agriculture, Fisheries and Forestry 2012, Workplace Health and Safety Policy Statement, [http://intranet.daff.govnet.qld.gov.au/\\_data/assets/pdf\\_file/0009/11700/whs-policy-statement.pdf](http://intranet.daff.govnet.qld.gov.au/_data/assets/pdf_file/0009/11700/whs-policy-statement.pdf)

- Workplace Health and Safety Queensland 2003 *Hazardous Chemicals Code of Practice 2003*. <http://www.deir.qld.gov.au/workplace/resources/pdfs/hazardous-chemicals-cop-2003.pdf>
- Workplace Health and Safety Queensland 2011 *Managing Noise and Preventing Hearing Loss at Work Code of Practice 2011*. <http://www.deir.qld.gov.au/workplace/resources/pdfs/noise-preventing-hearing-loss-cop-2011.pdf>

## 11. CONTACT INFORMATION

For further advice regarding this document, contact the Biosecurity Queensland Workplace Health and Safety Coordinator, ph. 0429 065 834, or DAFF WHS unit.

## 12. APPENDICES

Appendix 1: General Information on PPE

Appendix 2: Guide to PPE for various hazards

Released by DAFF  
RTI Act 2009

**13. AMENDMENT HISTORY**

Version	Date	Author/s	Amendments
1	5 June 2012	Claire Moore	New BQ document

**14. APPROVAL DETAILS**

Endorsed by: Trevor van Dam Sch4p4(6) Signature 20/6/12

Approved by: Jim Thompson Sch4p4(6) Signature 21/6/12

Issue/approval date – 21 JUN 2012

Released by DAF  
RTI Act 2009



The following information is a brief overview of the main types of PPE available. Further and more specific information should be sought from the relevant Australian Standards.

## **1. Protective Clothing**

- Protective clothing / garments appropriate to the task being undertaken are to be worn.
- Suitable protective clothing / garments are to be determined through task-based risk assessment/s.
- Protective clothing includes, but is not limited to:
  - high visibility clothing
  - overall/coveralls
  - dust coats/gowns
  - aprons
  - sleeve protectors/shoe and boot covers
  - beard/hair covers
  - clothing for cold or hot environments
  - clothing for sun or weather protection
- When selecting protective clothing, the following aspects must be considered:
  - the parts of the body to be protected
  - the routes of exposure to the hazard/s
  - the type and level of protection required
  - the ease of wearing (e.g. putting on, taking off, comfort, weight, flexibility)
  - the working environment
  - whether the clothing introduces other hazards, e.g. getting caught on machinery; potential for increased heat load on the wearer
  - compatibility with other items of PPE
  - durability (e.g. during normal wear, laundering, decontamination) and resistance (e.g. to degradation, abrasion)
  - whether disposable or reusable protective clothing is appropriate
  - ease of cleaning and maintenance
  - method of disposal
- Protective garments such as laboratory coats, aprons or overalls are generally necessary to protect workers who handle hazardous products, materials or equipment.
- Torn or ragged garments are ineffective and may pose a hazard (e.g. by catching on objects). Damaged items are to be repaired, replaced or discarded.
- Protective garments are to be removed on leaving the workplace area (e.g. laboratories / designated quarantine areas) and are not to be worn in the lunch rooms, stairwells, toilets, office areas, vehicles and public areas.
- Disposable protective garments are to be appropriately discarded after use in a manner which avoids contamination of the work area and the environment.
- Workers are to ensure that their reusable protective garments are appropriately laundered on a regular basis. Protective garments should be laundered separately to personal clothing.

- Under no circumstances are seriously contaminated garments, e.g. those involved in an unusual incident such as a large chemical spill, or those exposed to highly toxic, carcinogenic or potentially infectious materials, be submitted for routine laundry service. Such items should be bagged and special arrangements made for cleaning or disposal.
- Refer to relevant Australian Standards and Codes of Practice for more information on protective clothing.

## 2. Eye and Face Protection

- Eye and/or face protection appropriate to the task being undertaken is to be worn where required.
- Suitable eye protection is to be determined through task-based risk assessment/s.
- Appropriate eye/face protection is to be worn where there is a risk of exposure to or damage to the eyes or face through impact, flying objects, splashing of liquids, foreign particle entry and/or radiation.
- Full face protection is to be used for, but not limited to, the following activities:
  - tasks involving the use of corrosive liquids, cryogenic fluids, combustion processes, chemicals that may cause direct damage to the skin; chemicals and biological agents that may be rapidly absorbed into the body via any path e.g. through the skin, eyes and nose
  - where glass apparatus is evacuated, recharged with gas or pressurised
  - where there is a risk of breakage, explosion or implosion.
- When selecting eye or face protection, the following aspects must be considered:
  - the type of hazard (e.g. flying particles, dust / abrasive particles, droplets, chemicals, radiation)
  - routes of exposure
  - the level of protection required
  - the conditions under which the worker is working
  - the ease of wearing (e.g. putting on, taking off, comfort, weight,)
  - communication and visual requirements
  - the possibility of fogging up
  - compatibility with other items of PPE
  - ease of cleaning and disinfection
  - ease of maintenance and repair
  - storage requirements
  - method of disposal
- Prescription spectacles and contact lenses are not to be considered as a substitute for eye safety protection. Over-glasses, goggles, face shields etc may be worn over normal prescription spectacles.
- Refer to relevant Australian Standards and Codes of Practice for more information on protective equipment for the eye and face.

### 3. Foot Protection

- Suitable protective footwear is to be determined through task-based risk assessment/s.
- Appropriate footwear (i.e. non-slip, impervious) is to be worn by all workers working in laboratory areas. Open-toed shoes are not to be worn in laboratory areas.
- Protective footwear is to be worn by workers assigned to work where there is a moderate to high risk of foot injury resulting from, but limited to:
  - contact with falling, rolling or cutting objects
  - penetration through the sole or uppers
  - degloving
  - explosions / electrical hazards
  - contact with chemicals, heat and molten metals
  - slipping on wet, oily or soapy surfaces
- When selecting protective footwear, consideration must be given to the combination of footwear type, sole material, tread design and upper design and material best suited to the application.
- Refer to relevant Australian Standards and Codes of Practice for more information on protective footwear.

### 4. Hand and Arm Protection

- Hand and arm protection appropriate to the task being undertaken is to be worn where required.
- Appropriate hand and arm protection is to be determined through task-based risk assessment/s.
- Appropriate hand and arm protection (i.e. gloves) is generally necessary to protect workers from:
  - heat or cold
  - abrasions, cuts and slicing
  - chemicals
  - biologicals
  - electrical shock
  - radiation
  - vibration
- To ensure the most appropriate glove is provided, the following aspects must be considered:
  - the type of hazard and the level of protection required
  - the level of manual dexterity required
  - whether reusable or disposable gloves are appropriate
  - that the material of the glove will not be degraded or damaged by the hazard, e.g. is not degraded by or permeable to chemicals
  - that the material of the glove is acceptable to wearers, and does not cause allergic reactions
  - cleaning and maintenance requirements
  - disposal methods

- Reusable gloves are to be:
  - inspected for damage prior to each use
  - cleaned regularly to prevent cross-contamination
  - stored appropriately
  - replaced when necessary
- Reusable gloves are not to be used for microbiological work.
- Disposable gloves are to be appropriately discarded after use.
- Gloves are not to be worn outside the immediate area of use or workplace area, or during activities such as answering telephones or using computers.
- Refer to relevant Australian Standards and Codes of Practice for more information on gloves and protective equipment for hands and arms.

## 5. Head Protection

- Head protection appropriate to the task being undertaken is to be worn where required.
- Appropriate head protection is to be determined through task-based risk assessment/s.
- Head protection, e.g. helmets, hard hats, should be worn where there is a risk of a worker:
  - being struck on the head by a falling object
  - striking their head against a fixed object
  - striking their head due to restricted head space
  - inadvertently making head contact with electrical hazards
  - suffering head injuries when undertaking activities involving riding bicycles, motorbikes, quad bikes or other related vehicles.
- When selecting head protection, the following aspects must be considered:
  - the type of hazard, and the level of protection required
  - the nature and location of the work being undertaken
  - the design and performance requirements of the head protection
  - the amount and ease of adjustment of the head protection
  - accessories required
  - compatibility with other items of PPE
  - ease of cleaning and disinfection
  - ease of maintenance and repair
- Refer to relevant Australian Standards and Codes of Practice for more information on protective headwear.

## 6. Hearing Protection

- Hearing protection is to be worn where noise levels may damage or impair hearing.
- Occupational exposure to noise should be controlled by elimination, engineering or administrative measures. Where elimination, engineering or administrative control measures are not practicable or not completely effective, hearing protection appropriate to the task being performed is to be worn.

- Suitable hearing protection is to be determined through task-based risk assessment/s.
- When selecting hearing protection, the following aspects must be considered:
  - the level of protection required
  - the ease of wearing (e.g. putting on, taking off, comfort, weight,)
  - characteristics and medical conditions of the wearer
  - communication requirements
  - compatibility with other items of PPE
  - ease of cleaning and disinfection
  - ease of maintenance and repair
  - method of disposal
- Hearing protection is not to be shared between workers.
- Refer to relevant Australian Standards and Codes of Practice for more information on hearing protection.

## 7. Respiratory Protection

- Occupational exposure to airborne contaminants is best controlled by higher level control measures that prevent air contamination, e.g. eliminating dust creating procedures, installing fume / dust cupboards, extraction hoods.
- Where engineering control measures are not reasonably practicable, respiratory protection appropriate to the task being undertaken is to be worn.
- Respiratory protection prevents airborne contaminants (e.g. micro-organisms, toxic dusts, fibres, particles, fumes, mists, gases, vapours) from entering the body through the respiratory system.
- Appropriate respiratory protection is to be determined through task-based risk assessment/s.
- When selecting respiratory protection, the following aspects must be considered:
  - the type (e.g. nature, concentration, toxicity) of hazard (e.g. dust, particulate, chemical vapours)
  - the level of protection required (e.g. P2, P3)
  - operator characteristics (e.g. facial hair, medical conditions)
  - the environment / temperature in which it is to be worn
  - the ease of wearing (e.g. putting on, taking off, comfort, weight)
  - communication and vision requirements
  - compatibility with other items of PPE
  - ease of cleaning and disinfection
  - ease of maintenance and repair
  - method of disposal
- Tasks are to be designed so that the prolonged wearing of respiratory protection is not required.
- Respiratory protection is not to be shared between workers.

- To provide the designed level of protection, close-fitting face-masks (e.g. half or full-face) must achieve an adequate facial seal, i.e. be properly fitted to the wearer. Fit-testing of the face-mask is to be carried out before initial use to ensure an appropriate fit. The fit of the mask must also be checked prior to each use.
- Refer to relevant Australian Standards and Codes of Practice for more information on respiratory protection.

#### **8. Other Personal Protective Equipment**

- Other personal protective equipment suitable for the task being undertaken should be worn where required.
- Other PPE may include, but is not limited to, safety belts and harnesses, and fall arrest systems.
- Suitable PPE is to be determined through task-based risk assessment/s.
- Refer to relevant Australian Standards and Codes of Practice for more information on other personal protective equipment.

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**APPENDIX 2: Quick Guide to PPE for various hazards.**

**(Note: More detailed / specific advice should be sought from the relevant Australian Standard, Codes of Practice or the chemical's Safety Data Sheets.)**

Hazard Type	Examples of hazard or when exposure may occur	Protective clothing	Protective footwear	Hand / arm protection	Eye / face protection	Respiratory protection	Hearing	Head	Other
<b>Animals / insects / plants</b>	Snakes, mosquitos / stinging insects; stinging plants  Carrying out surveillance, inspections or control activities; disease responses	✓	✓	✓	✓			✓	
<b>Biological</b>	Bacteria, viruses, fungi, mould, zoonotics, grain dust  Working in the field / carrying out surveillance or control activities / disease responses	✓	✓	✓	✓	✓			
<b>Chemical</b>	Insecticides / herbicides, bromine gas, tick treatments, disinfectants, gases, fumes, vapours  Inspecting, sampling, auditing of produce / grains / seeds; inspecting / treating for ticks; applying chemicals for weed / pest control; poultry sheds	✓	✓	✓	✓	✓			
<b>Cutting, sharp or protruding objects</b>	Knives, secateurs, wire, sheets of metal, nails	✓	✓	✓	✓				
<b>Crush / collision</b>	Forklifts, cattle trucks, ATVs, getting caught in machinery, dropping heavy objects onto feet	✓	✓	✓				✓	Seat belts; ROPS
<b>Electrical</b>	Damaged power cords / electrical equipment	✓	✓	✓					



Hazard Type	Examples of hazard or when exposure may occur	Protective clothing	Protective footwear	Hand / arm protection	Eye / face protection	Respiratory protection	Hearing	Head	Other
Falling or moving objects	Tree branches when cutting down trees, feed bags, hay bales, dropping heavy objects	✓	✓	✓	✓			✓	
Falling from heights	Climbing up into produce bins to inspect / sample produce, climbing onto trucks to inspect cattle, ladders		✓						Safety harness / fall restraint
Noise	Machinery in packing sheds / grain storage, feed mills, hammering steel, grinding						✓		
Projectiles or flying particles	From cutting, sawing, drilling grinding	✓	✓	✓	✓	✓			
Radiation (e.g. UV, sun,	Working outdoors in sun, welding.	✓	✓	✓	✓				Sunscreen
Thermal energy (heat)	Fires, hot liquids, welding	✓	✓	✓	✓	✓			
Temperature (hot or cold)	Working in heat / cold	✓	✓	✓	✓				
Vibration	When using air-guns, chainsaws, brush-cutters, jack hammers, earthmoving equipment			✓					

Task Analysis And Risk Assessment					
<b>Analysis Completed By</b>	Stacy Harris			<b>Date Completed</b>	02 July 2014
<b>Task</b>	The safe management and use of Departmental firearms				
<b>Purpose / Outcomes Required</b>	Conduct humane destruction of pest animals in the field using firearms.				
<b>Procedures Relevant To Task</b>	Departmental firearms manual				
<b>Task Location / Environment</b>	Field and urban environments, including remote and regional environments.				
<b>People / Positions / Roles Required</b>	Biosecurity Officers, may be assisted by other government agencies and community groups.				
<b>Training Required</b>	Current first aid certificate, current firearms licence, current departmental firearms licence.				
<b>Equipment / Materials Required</b>	<input checked="" type="checkbox"/> Sampling	<input checked="" type="checkbox"/> Surveillance	<input checked="" type="checkbox"/> 4WD Vehicles	<input checked="" type="checkbox"/> Tools / Instruments	<input checked="" type="checkbox"/> Firearms
	<input type="checkbox"/> Post -Mortem Kit	<input checked="" type="checkbox"/> Lifting / Moving	<input type="checkbox"/> Drugs	<input checked="" type="checkbox"/> Chemicals	<input type="checkbox"/> Response Kit
	<input checked="" type="checkbox"/> PPE	<input type="checkbox"/> Waste Disposal	<input checked="" type="checkbox"/> Decontamination	<input checked="" type="checkbox"/> Hand wash hygiene	<input checked="" type="checkbox"/> First Aid Kit
	<input checked="" type="checkbox"/> Survival Equipment	<input checked="" type="checkbox"/> Communications	<input type="checkbox"/> Food	<input checked="" type="checkbox"/> Water	
	<input type="checkbox"/> Other:				
<b>Communication Requirements</b>	All vehicles used must be fitted with a UHF radio. All personnel must have a mobile phone.				
<b>Other Considerations (E.g. Entry / Exit Requirements)</b>	Entry to private property with landholder consent unless undertaking enforcement action. Entry may be undertaken in accordance with a Pest Survey Program. Permission to use firearms on any property must be obtained prior to using firearms on the property.				

Hazard	Risk	Likelihood	Consequence	Risk	Controls	Residual Risk	Risk Owner
<b>A. STORAGE AND MAINTENANCE OF FIREARMS</b>							
Unauthorised person getting access to Departmental firearms	Death or injury caused by unauthorised user operating firearm	Unlikely	Moderate	Medium	<ul style="list-style-type: none"> <li>Firearms must be secured in a locked steel purpose-built gun safe and bolted to the floor or frame of the building, on Departmental premises as per Departmental standards.</li> <li>Firearms must be stored unloaded with the bolt removed and secured separately.</li> <li>Combination codes and any keys should be held by an officer possessing an appropriately endorsed Firearms Licence.</li> <li>No unlicensed staff should be allowed to have access to or to handle firearms, to know combination codes, or be allowed to have access to any keys to gun safes' internal compartments.</li> <li>Magazines and ammunition should be stored and secured either separately from firearms in a locked container, or in a locked compartment within the gunsafe.</li> <li>Wherever possible, each firearm should be allocated to an individual officer who is responsible for its security, maintenance, sighting-in and general care.</li> <li>Operators must maintain the Police Form 23 - Employee Issue Register which records the date and time when the firearm is issued and returned; the whereabouts of each firearm; and the officer responsible for it's security to be identified at all times.</li> <li>Departmental employees are not to store private firearms in departmental gunsafes.</li> </ul>	Low	Firearm operator
Unauthorised person getting access to	Death or injury caused by unauthorised user	Unlikely	Moderate	Medium	<ul style="list-style-type: none"> <li>If the vehicle has a boot, the firearm must be locked in the boot, and contained in a scabbard or other guncase.</li> </ul>	Low	Firearm operator

Departmental firearms during transport	operating firearm				<ul style="list-style-type: none"> <li>If the vehicle does not have a boot, the firearm must be carried within the cabin, stowed out of sight, within a closed scabbard or other guncase or container.</li> <li>The bolt or trigger group must be removed and secured separately, or where this is not possible a fitted breech or trigger lock must be used.</li> <li>Ammunition must be stored separately in a locked container.</li> <li>The vehicle must be locked whenever practical and the keys retained by a licensed officer (to deny ready access to the firearm by an unlicensed person or unauthorised officer).</li> <li>The officer in control of the firearm must always be in attendance at or in the vehicle at any time it is unloaded.</li> <li>Departmental employees are not to carry private firearms in departmental vehicles or vessels.</li> </ul>		
Firearm serviceability and maintenance	Injury caused by the malfunction of a firearm	Possible	Major	High	<ul style="list-style-type: none"> <li>Operators must ensure that firearms are cleaned, lubricated and maintained to high standards daily when in use; or prior to and after every use.</li> <li>Operators are ensure that firearms subjected to significant use (i.e. more than 500 rounds fired per year) are checked annually by a competent gunsmith, and records of inspection kept.</li> <li>Operators of firearms not subjected to significant use should be similarly checked at least every two years, and records of inspections kept.</li> <li>Departmental employees are not to use private firearms in the course of official activities.</li> <li>Operators are to ensure they have a toolkit to maintain the firearms and to rectify small problems in the field.</li> </ul>	Low	Firearm operator
<b>B. LICENCING AND TRAINING</b>							
Unlicensed operators	Charge for breach of legislation or litigation	Minor	Possible	Medium	<ul style="list-style-type: none"> <li>All Departmental operators must hold a civilian firearms licence for the category of firearm being used (A, B, C and/or D).</li> <li>Operators must have an authority to use Departmental Firearms endorsed with the category</li> </ul>	Low	Departmental Firearm Coordinator

					for the firearm being used.		
Untrained operators	Death or serious injury from incorrect use of firearms	Severe	Almost Certain	Extreme	<ul style="list-style-type: none"> <li>Operators must have completed the Departmental firearms course in the safe use of firearms and humane destruction.</li> <li>Operators must zero the weapon to be used at the range prior to use in the field.</li> <li>Operators must be familiar with the safe operation of the specific firearm being used.</li> <li>Operators are not to use a weapon for which they have not been trained and endorsed during the Departmental firearms course.</li> <li>Operators must check accessories do not interfere with the operation of the firearm.</li> </ul>	Low	Principal Biosecurity Officers Departmental Firearm Coordinator Firearm operator
<b>C. UNDERTAKE SHOOTING ACTIVITIES</b>							
Unauthorised personnel on property during shooting activities	Death or gunshot wound from accidental shooting	Major	Unlikely	Medium	<ul style="list-style-type: none"> <li>Operators must confirm with the landholder that they are aware of the use of firearms and have given permission for the use of firearms on their property.</li> <li>Operators must ensure the landholder does not have any known persons in the proposed are of operations.</li> <li>Shooting to be undertaken only on the property designated</li> <li>Inspection of the property to undertaken on arrival to ensure no visitors, vehicles or other hazards are present.</li> <li>Operators are to continue to visually inspect for hazards while hunting and prior to every shot.</li> <li>If members of the public are encountered during shooting, all shooting is to cease immediately.</li> </ul>	Low	Firearm operator
Lack of familiarity of the area of operations	Operator becoming lost, shooting on unauthorised land.	Major	Unlikely	Medium	<ul style="list-style-type: none"> <li>Officers are to conduct a reconnaissance of the area of operations during daylight hours to familiarise themselves with routes, hazards and other issues relevant to the specific property.</li> </ul>	Low	Firearm operator
Poor planning of operation	Injury or death to people involved due to disorganisation	Major	Possible	High	<ul style="list-style-type: none"> <li>Ensure comprehensive plan is developed in SMEAC and briefed to all participants prior to operation.</li> </ul>	Low	Team leader

	and/or confusion						
Manual handling; accessing rifles from vehicles	Sprains, strains, accidental discharge	Minor	Unlikely	Low	<ul style="list-style-type: none"> <li>Manual handling training.</li> <li>Operators to use correct lifting technique.</li> <li>Appropriate vehicle selection for carrying firearms.</li> <li>Ensure all rifles are unloaded and inspected as clear of ammunition before loading into vehicle.</li> <li>All ammunition and bolts to be stored separately from firearms when transporting in vehicle.</li> <li>Always keep firearms pointed in a safe direction when loading or unloading.</li> <li>Do not lean firearms against parked vehicles or any other object from which the firearm could fall or slide.</li> </ul>	Low	Firearm operator
Projectile leaving designated property (including ricochet).	Death, injury or damage to persons, animals and infrastructure	Major	Possible	High	<ul style="list-style-type: none"> <li>Shooting operations to be undertaken only on the property designated</li> <li>Operators to assess background prior to every shot, no shots to be taken on skylines or where background is unknown.</li> <li>No shooting where projectiles may leave property boundary.</li> <li>No shooting at surfaces that may induce ricochet, including rocks, water etc.</li> </ul>	Low	Firearm operator
Loaded firearm	Death or injury from accidental discharge.	Major	Likely	High	<ul style="list-style-type: none"> <li>Firearms to remain at 'load' (bolt closed, no rounds in the chamber, rounds in the magazine) until target is sighted an operator is ready to fire.</li> <li>Firearms are to be unloaded and inspected prior to crossing fences or loading and unloading into vehicles, buildings etc.</li> <li>Operators to take a firm firing position prior to firing.</li> <li>Firearms are to be made safe before the officer moves.</li> <li>If the firearm is loaded and no shot is taken, firearm is to be unloaded prior to moving.</li> <li>When transporting a firearm with a loaded magazine (in a state of readiness for firing but before taking aim at a target), the barrel must be pointing to the floor of the vehicle.</li> </ul>	Low	Firearm operator

Using a support (tree etc) when shooting	Death or injury from movement of firearm when firing	Major	Unlikely	Medium	<ul style="list-style-type: none"> <li>Officer is to check the stability or a rest before using it to shoot from.</li> <li>Officer is to ensure the muzzle remains clear before shooting.</li> <li>Officer is to adopt the most stable firing position prior to shooting.</li> </ul>	Low	Firearm operator
Using firearms	Tinnitus from firearm discharge noise, eyesight damage from ricochet or firearm malfunction.	Major	Almost certain	Extreme	<ul style="list-style-type: none"> <li>Hearing protection must be worn when using a firearm.</li> <li>Eye protection must be worn when using a firearm.</li> <li>All officers to wear high-visibility clothing when using firearms in a group situation.</li> </ul>	Low	Firearm operator
Using firearms	Accidental injury or death from misuse of firearm	Major	Possible	High	<ul style="list-style-type: none"> <li>Operators must maintain awareness of the muzzle and always keep the muzzle pointed in a safe direction.</li> <li>Firearms must be cleared and proven safe before any cleaning is attempted.</li> </ul>	Low	Firearm operator
Using firearms	Injury from firing with an obstructed barrel	Major	Unlikely	Medium	<ul style="list-style-type: none"> <li>If a firearm is dropped, it should be checked at once for obstructions in the barrel and action.</li> <li>Before firing, oil must be removed from the barrel, bolt face and chamber of the firearm.</li> <li>Never rest the muzzle of the firearm into the ground. This may cause a plug of earth to lodge in the barrel.</li> </ul>	Low	Firearm operator
Using firearms at night.	Death or injury to other members due to poor situational awareness	Major	Possible	High	<ul style="list-style-type: none"> <li>Reflective clothing to be worn when operating at night.</li> <li>All firearms clearances to be conducted using white light.</li> <li>Targets to be clearly identified prior to shooting.</li> <li>Only one nominated shooter is to be using firearms at any time</li> </ul>	Low	Firearm operator
Faulty ammunition	Injury from malfunction of ammunition	Major	Unlikely	Medium	<ul style="list-style-type: none"> <li>All ammunition is to be inspected prior to use.</li> <li>Where night shooting is being conducted, ammunition must be inspected under white light.</li> <li>Only factory manufactured ammunition may be used.</li> <li>Ammunition is to be stored in the original packaging or a purpose-designed ammunition container that</li> </ul>	Low	Firearm operator

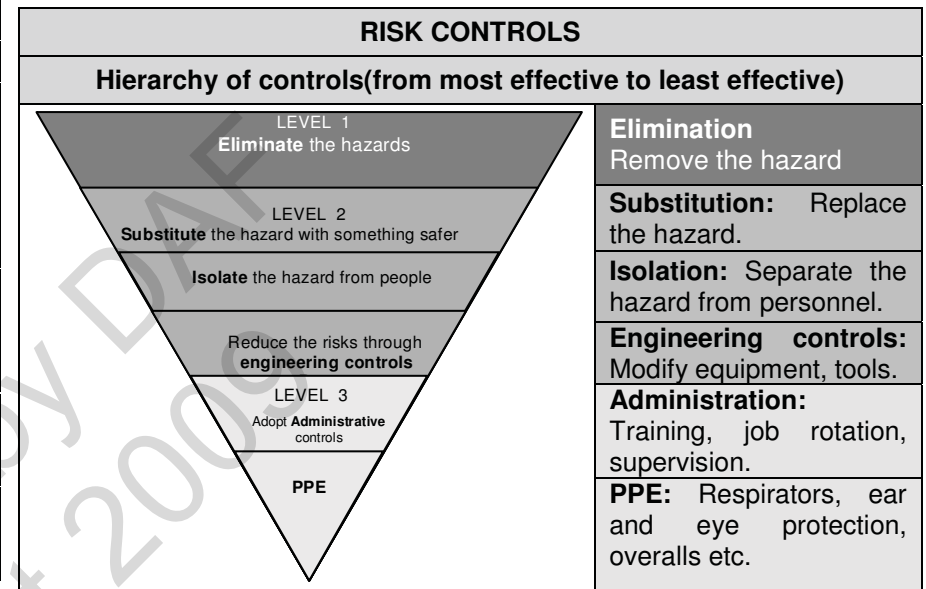


					<ul style="list-style-type: none"> <li>separates individual rounds.</li> <li>Any faulty ammunition is to be separated and disposed of appropriately.</li> </ul>		
Wounded animal	Injury from wounded animal attack, animal trauma			<b>Med</b>	<ul style="list-style-type: none"> <li>Officers must be confident of achieving a clean kill before taking a shot.</li> <li>Officers are to approach any animal cautiously and stay clear until confident that animal is dead.</li> <li>Wounded animals must be destroyed humanely immediately.</li> <li>Officers must maintain a safe route of escape in case of encountering another animal.</li> </ul>	<b>Low</b>	Firearm operator
Angry or disgruntled landholders	Physical or emotional abuse	Negligible	Unlikely	<b>Low</b>	<ul style="list-style-type: none"> <li>Officers do not need to deal with aggressive behaviour.</li> <li>Officers to avoid physical confrontations and report to supervisor or Police as appropriate.</li> <li>Officers are not to use firearms for self defence unless threatened with imminent death.</li> <li>Officers are not to conduct shooting operations on any property without first obtaining permission from the property occupier.</li> </ul>	<b>Low</b>	All Officers
<b>D. ENVIRONMENTAL FACTORS</b>							
Disorientation or becoming lost during survey.	Exposure or dehydration due to prolonged time out of contact. Injuries becoming more serious due to inability to contact emergency services	Major	Unlikely	<b>Medium</b>	<ul style="list-style-type: none"> <li>Operators to be inducted into operating area, including actions on becoming lost or separated.</li> <li>Daily briefing to be conducted by the Team Leader prior to departure each day. This must include reference to maps of the area of operations (AO) and likely hazards and risks relevant to the operation.</li> <li>Biosecurity officers to carry UHF radios and/or mobile phones for contact.</li> <li>Operators to stay in teams of 2 as a minimum. Operators to maintain visual contact with each other during shooting operations.</li> <li>Operators to carry maps and GPS/compass if operating in unfamiliar and remote locations.</li> <li>Operators to wear high-visibility clothing while conducting surveys.</li> <li>Operators to take regular, scheduled breaks to</li> </ul>	<b>Low</b>	Team Leader

					confirm all members present and current location.		
Loss of communications	Injury caused by inability to access help during emergencies	Major	Unlikely	Medium	<ul style="list-style-type: none"> <li>All communications equipment must be checked daily before operation.</li> <li>Batteries must be recharged daily or replaced regularly.</li> <li>Radio check conducted with each radio daily before operation.</li> <li>Each officer to carry a mobile phone and a UHF radio for the operation.</li> <li>Officers to carry a PDA or GPS.</li> </ul>	Low	Team Leader
Loss of situational awareness	Injury or stress caused by loss of situational awareness	Moderate	Likely	Medium	<ul style="list-style-type: none"> <li>Daily briefing to be conducted by the Team Leader prior to departure each day. This must include reference to maps of the area of operations (AO) and likely hazards and risks relevant to the operation.</li> <li>All shooting must cease if contact is lost between members.</li> </ul>	Low	Team Leader

Risk Assessment Prepared By:	Stacy Harris (Name)	<i>Original signed</i> (Signature)	02 July 2014 Date
Reviewed By:	Matt Ryan (Name)	<i>Original signed</i> (Signature)	02 July 2014 Date
Approved By:	Duncan Swan (Name)	<i>Original signed</i> (Signature)	02 July 2014 Date

DESCRIPTION OF LIKELIHOOD AND CONSEQUENCE		
Likelihood	%	Consequence
<b>Almost certain:</b> Event expected to occur in most circumstances. There are few or no protective measures or controls in place.	100	<b>Severe:</b> Multiple fatalities or permanent disability.
<b>Likely:</b> A 50% or greater chance of an event occurring.	50-100	<b>Major:</b> Single fatality, serious bodily injury or illness requiring casualty treatment.
<b>Possible:</b> An event may occur at some time. There is clear evidence of similar occurrences or there is a general view that a similar event could occur.	15-50	<b>Moderate:</b> Moderate injury or minor illness requiring casualty treatment.
<b>Unlikely:</b> An event is unlikely to occur, but there is a history of a similar event having occurred.	5-15	<b>Minor:</b> Minor injury or minor illness. First aid only. No lost work time.
<b>Rare:</b> An event may occur in exceptional circumstances, but there is no history of a similar event having occurred.	0-5	<b>Negligible:</b> No medical treatment required.



RISK LEVEL MATRIX					
Likelihood	Consequences				
	Negligible	Minor	Moderate	Major	Severe
Almost certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	High
Unlikely	Low	Low	Medium	Medium	Medium
Rare	Low	Low	Low	Low	Medium

RISK LEVEL ACTIONS	
Risk Level	Importance and actions
<b>Extreme</b>	<b>ACT NOW.</b> Stop activity until risk is controlled and control risk immediately. Senior executive management attention is needed urgently with management responsibility specified.
<b>High</b>	Stop activity until risk is controlled. Management decision is required urgently.
<b>Medium</b>	Corrective action required and scheduled according to priority. Follow Management instructions.
<b>Low</b>	OK for now. Record and review if any equipment, people, materials or procedures are changed.