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OCCUPATIONAL HEALTH AND SAFETY ACT 1989

INSTRUMENT OF APPROVAL

No. 17 of 1994

UNDER Section 87 (1) of the *Occupational Health and Safety Act 1989*, I Wayne Bruce Berry, approve after consultation with the Occupational Health and Safety Council, the National Standard for Occupational Noise [NOHSC:1007(1993)] and the National Code of Practice for Noise Management and Protection of Hearing at Work [NOHSC:2009(1993)].

Dated this 14th day of January 1994

WAYNE BRUCE BERRY
DEPUTY CHIEF MINISTER
ON BEHALF OF THE
CHIEF MINISTER

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National Occupational Health And Safety Commission

OCCUPATIONAL NOISE

National Standard for Occupational Noise
[NOHSC:1007(1993)]

National Code of Practice for Noise Management and Protection of Hearing at Work
[NOHSC:2009(1993)]

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FOREWORD

The National Occupational Health and Safety Commission is a tripartite body established by the Commonwealth Government to develop, facilitate and implement a national occupational health and safety strategy.

This strategy includes standards development, the development of hazard-specific and industry-based preventive strategies, research, training, information collection and dissemination and the development of common approaches to occupational health and safety legislation.

The National Commission comprises representatives of the peak employee and employer bodies — the Australian Council of Trade Unions and the Australian Chamber of Commerce and Industry — as well as the Commonwealth, State and Territory governments.

Consistent with the National Commission's philosophy of consultation, tripartite standing committees have been established to deal with issues relating to standards development, research and the mining industry. Expert groups and reference groups may be established to provide advice to the standing committees on those issues with which the National Commission is concerned.

PREFACE

Occupational noise-induced hearing loss (NIHL) is the most prevalent compensable industrial disease in Australia and entails substantial economic costs.

Each year about 10,000 people are awarded lump sum compensation payments for NIHL. The annual national cost is estimated to be well over $35 million in lump sum compensation payments alone, excluding administrative and legal costs.

These figures provide a conservative estimate of the cost and number of NIHL cases. Evidence indicates that less than a third of employees with NIHL register a claim for compensation. Moreover, each year, in addition to claims made under workers' compensation legislation, there are a number of successful common law claims, with awards exceeding $100,000 in some cases. Thus, data on compensation for NIHL represent only a proportion of the actual magnitude of this occupational health problem.

Exposure to excessive noise also entails largely unrecognised costs to organisations by way of increased employee turnover and absenteeism, lowered performance and possible contribution to accidents.

As well as the economic cost for employers, NIHL imposes a severe burden on health and social services, and the Australian economy as a whole.

To the individual affected, the social handicaps of NIHL are also severe. NIHL is irreversible and leads to communication difficulties, impairment of interpersonal relationships, social isolation and a very real degradation in the quality of life. As a result, the family and others close to the affected person often experience secondary consequences of the condition. Hearing aids are of limited benefit in overcoming the problems of NIHL. Of those people affected, 20 per cent or more also suffer from tinnitus (ringing in the ears), in some cases to a severe degree.

The National Commission is concerned about noise-induced hearing loss as a major occupational disease. In this regard, the National Commission endorsed its *National Strategy for the Prevention of Occupational Noise-induced Hearing Loss* [NOHSC:4004(1989)][1] in December 1988. In the context of this strategy, the National Commission developed the *Draft National Standard for Occupational Noise* and the *Draft National Code of Practice for Noise Management and Protection of Hearing at Work.*

The draft national standard and draft national code of practice, with five options for a standard, were released for public comment in November 1989. Having considered public comment on the draft document, the National Commission declared the *National Standard for Occupational Noise* [NOHSC:1007(1993)] in March 1992. The National Commission now declares the *National Code of Practice for Noise Management and Protection of Hearing at Work* [NOHSC:2009(1993)]. This is pursuant to s.38(1) of the *National Occupational Health and Safety Commission Act 1985* (Cwlth).

The National standard for exposure to noise in the occupational environment is an average daily exposure level of 85 decibels (A-weighted), or 85dB(A). This is consistent with overwhelming scientific evidence which indicates that exposure levels above 85dB(A) represent an unacceptable risk to the hearing of those exposed. Many other western countries have already introduced legislation or are preparing legislation based on this standard. For peak noise, the national standard is a peak linear level of 140 decibels, or 140dB(lin). Both components of the national standard are explained more fully on the following pages.

The *National Code of Practice for Noise Management and Protection of Hearing at Work* [NOHSC:2009(1993)] provides practical guidance on how the national standard can be achieved.

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1. National Occupational Health and Safety Commission, *National Strategy for the Prevention of Occupational Noise-induced Hearing Loss* [NOHSC:4004(1989)], Australian Government Publishing Service, Canberra, 1989.

The national code of practice is intended to assist employers, employees, unions, management, health and safety committee representatives, safety officers, occupational health and safety professionals and others requiring guidance on understanding and reducing workplace noise exposure.

The levels specified in the national standard are the maximum acceptable exposure levels for noise in the workplace. However, over long periods, repeated noise exposure at between 75dB(A) and 85dB(A) may be a small risk to some people. With progressively increasing levels, the risk becomes greater. Workplace noise levels lower than 85dB(A) are therefore desirable, if practicable.

NATIONAL STANDARD FOR OCCUPATIONAL NOISE [NOHSC:1007(1993)]

1. TITLE

1.1 This national standard may be cited as the *National Standard for Occupational Noise* [NOHSC:1007(1993)].

2. OBJECTIVE

2.1 The objective of this *National Standard for Occupational Noise* [NOHSC:1007(1993)] is to reduce significantly the incidence and severity of occupational noise-induced hearing loss.

3. NATIONAL STANDARD FOR OCCUPATIONAL NOISE

3.1 The national standard for exposure to noise in the occupational environment is an eight-hour equivalent continuous A-weighted sound pressure level, $L_{Aeq,8h}$, of 85dB(A). For peak noise, the national standard is a peak noise level, L_{peak}, of 140dB(lin).

3.2 The exposure to noise is taken to be that measured at the employee's ear position without taking into account any protection which may be afforded by personal hearing protectors.

4. INTERPRETATION

4.1 In this *National Standard for Occupational Noise* [NOHSC:1007(1993)]:

'$L_{Aeq,8h}$' (eight-hour equivalent continuous A-weighted sound pressure level in dB(A) referenced to 20 micropascals) means that steady noise level which would, in the course of an eight-hour period, cause the same A-weighted sound energy as that due to the actual noise over an actual working day. $L_{Aeq,8h}$ is to be determined in accordance with Australian Standard AS 1269[1].

'L_{peak}' (peak noise level) means linear (unweighted) peak hold sound pressure level in decibels referenced to 20 micropascals and measured by a sound level meter with a peak detector-indicator characteristic complying with Australian Standard AS 1259.1[2].

'Noise' means any unwanted or damaging sound.

'Personal hearing protectors' means a device, or pair of devices, worn by a person or inserted in the ears of a person to protect the person's hearing.

REFERENCED DOCUMENTS

1. Standards Australia, AS 1269 *Acoustics—Hearing Conservation*, Standards Australia, Sydney.

2. Standards Australia, AS 1259.1 *Acoustics—Sound Level Meters, Part 1: Non-integrating*, Standards Australia, Sydney.

NATIONAL CODE OF PRACTICE FOR NOISE MANAGEMENT AND PROTECTION OF HEARING AT WORK [NOHSC:2009(1993)]

1. TITLE

1.1 This national code of practice may be cited as the *National Code of Practice for Noise Management and Protection of Hearing at Work* [NOHSC:2009(1993)].

2. PURPOSE

2.1 This *National Code of Practice for Noise Management and Protection of Hearing at Work* [NOHSC:2009(1993)] provides practical guidance on how the *National Standard for Occupational Noise* [NOHSC:1007(1993)] can be achieved.

3. SCOPE

3.1 This *National Code of Practice for Noise Management and Protection of Hearing at Work* [NOHSC:2009 (1993)] applies to all workplaces where there is potential for exposure to excessive noise, the plant and processes in those workplaces, and all persons in those workplaces (consistent with relevant State/Territory legislation) with potential for exposure to excessive noise.

4. DEFINITIONS

4.1 In this *National Code of Practice for Noise Management and Protection of Hearing at Work* [NOHSC:2009 (1993)]:

'Acoustic' (or acoustical) means containing, producing, arising from, actuated by, related to, or associated with, sound.

'Acoustic calibrator' means a device for applying a sound pressure of known level to the microphone of a sound measuring system, for the purpose of calibration.

'Administrative noise control measures' are work systems designed to substantially reduce noise exposure, including the time exposed to noise. Examples are job rotation, job redesign or rosters which are designed to reduce exposure to noise. Engineering noise control measures and the use of personal hearing protectors are not included.

'Approved' means approved in writing by the relevant State, Territory or Commonwealth government authority.

'Attenuation' means a reduction in the magnitude of sound.

'Audiogram' means a chart or table relating a person's hearing threshold levels for pure tones to frequency.

'Audiometric test' (or testing) means the measurement of the hearing threshold levels of a person by means of monaural pure tone air conduction threshold tests.

'A-weighting' refers to a standardised frequency response used in sound measuring instruments. It corresponds approximately to the human ear response at low sound levels. Sound pressure levels measured using this response, which is specified in Australian Standard AS 1259.1[1], are expressed in units of dB(A).

'C-weighting' refers to a standardised frequency response used in sound measuring instruments. It corresponds approximately to the human ear response at high sound levels. Sound pressure levels measured using this response, which is specified in Australian Standard AS 1259.1[1], are expressed in units of dB(C).

'Competent person', in the context of supplying information on noise levels generated by plant, means a person whom the manufacturer or supplier ensures has acquired knowledge and skills, through a combination of training, education and experience, enabling that person to correctly perform a specified task.

'Consultation' means the sharing of information and exchange of views between employers, employees and/or employee representative(s) on health and safety issues. It includes the opportunity to contribute to decision making in a timely fashion to minimise the risk(s) of exposure to excessive noise.

'dB' means the abbreviation for decibel. Also ***see*** definition for 'decibel'.

'dB(A)' means A-weighted decibel. Also ***see*** definition for 'A-weighting'.

'dB(C)' means C-weighted decibel. Also ***see*** definition for 'C-weighting'.

'dB(lin)' means unweighted decibel. Also ***see*** definition for 'unweighted'.

'Decibel' is the unit used to indicate the relative magnitude of sound pressure level and other acoustical quantities. The range of sound pressures commonly encountered is very large so a logarithmic scale is used. The decibel is the unit used on this scale and is abbreviated to 'dB'. On the decibel scale, the threshold of hearing occurs at a sound pressure level of about 0dB and the threshold of pain occurs at about 120dB. As the decibel is also used to describe the level of other quantities, such as sound power and vibration acceleration, it is always necessary to refer to the specific quantity being measured, for example, $L_{Aeq,8h}$ or L_{peak}.

'Employee' means an individual who works under a contract of employment, apprenticeship or traineeship.

'Employee representative(s)' includes an employee member of a health and safety committee where established in the workplace, or a person elected to represent a group of employees on health and safety matters.

'Employer' means a corporation or an individual who employs persons under contract of employment, apprenticeship or traineeship.

Note: The definition of employer includes the *self-employed* which means a person who works for gain, other than under a contract of employment, apprenticeship or traineeship, whether or not that person employs others.

'Engineering noise control measures' means any engineering procedure that reduces the sound level either at the source of the noise or in its transmission, but does not include the use of administrative noise control measures or personal hearing protectors.

'Excessive noise' means, for the purpose of this national code of practice, noise that exceeds those levels defined in the *National Standard for Occupational Noise* [NOHSC:1007(1993)].

'Hazard' means anything that may result in harm to the hearing of a person.

'Hearing protection areas' means an area where employees may be exposed to noise levels exceeding $L_{Aeq,8h}$ 85dB(A) or L_{peak} 140dB(lin), as defined in the *National Standard for Occupational Noise* [NOHSC:1007(1993)]. During normal operations, no employee may enter such an area without wearing appropriate personal hearing protectors. Hearing protection areas should be clearly defined and sign-posted according to Australian Standard AS 1319[2].

'Impulse sound' (or noise) means sound consisting of a single pressure peak, or a sequence of such peaks, or a single burst with multiple pressure peaks whose amplitude decays with time, or a sequence of such bursts.

'Integrating sound level meter (ISLM)' means a sound level meter equipped with an integrating function which enables the meter to process a continuous, variable, intermittent or impulsive sound to give a single, integrated level or L_{eq} for the sampling period.

'$L_{Aeq,8h}$' (eight-hour equivalent continuous A-weighted sound pressure level in dB(A) referenced to 20 micropascals) means that steady noise level which would, in the course of an eight-hour period, cause the same A-weighted sound energy as that due to the actual noise over an actual working day. $L_{Aeq,8h}$ is to be determined in accordance with Australian Standard AS 1269[3].

'L_{peak}' (peak noise level) means linear (unweighted) peak hold sound pressure level in decibels referenced to 20 micropascals and measured by a sound level meter with a peak detector-indicator characteristic complying with Australian Standard AS 1259.1[1].

'Noise' means any unwanted or damaging sound.

'Noise control policy' means a written policy, developed by the employer, in consultation with employees and employee representative(s), which sets goals for noise exposure levels in the workplace and the strategies to be used to meet these goals.

'Noise exposure' means the amount of sound energy the unprotected ear of a person is exposed to, given as $L_{Aeq,8h}$ or as L_{peak}.

'Occupational noise-induced hearing loss' means hearing impairment arising from exposure to excessive noise at work. Occupational noise-induced hearing loss is also commonly known as industrial deafness.

'Octave band analysis' means analysis of the frequency content of noise into octave bands.

'Octave band filter' means a filter that attenuates all noise except that falling between two frequencies an octave apart. Octave band filters are used to measure which frequencies are present in a given noise.

'Peak noise level' *see* definition for L_{peak}.

'Personal hearing protectors' means a device, or pair of devices, worn by a person or inserted in the ears of a person to protect the person's hearing.

'Personal protection program' means a program for personal hearing protection and, where required, regular hearing testing, which is adopted where technical or economic problems delay, or make impracticable, the reduction of exposure to excessive noise by engineering or administrative noise control measures.

'Plant' means any machinery, equipment, appliance, implement or tool, and anything fitted or connected to them.

'Practicable' means 'practicable' in Victoria, Queensland, Western Australia and the Northern Territory, 'reasonably practicable' in New South Wales, South Australia, the Australian Capital Territory and Commonwealth jurisdiction, and a 'reasonable precaution' in Tasmania.

'Reverberation' means the persistence, by echo or reflection, of sound in an enclosure after the emission by the source has stopped.

'Risk' means the probability of harm occurring to the hearing of a person.

'Shall' means that a requirement is mandatory.

'Should' means a recommendation.

'Sound' means small fluctuations in the air pressure that result in a wave capable of exciting in a listener the sensation of hearing.

'Sound exposure meter (SEM)', or noise dosemeter, means an instrument for measuring noise exposure by automatically integrating sound energy over a measurement period and displaying the result on the dimensionless scale of noise dose. The instrument may be worn by the person concerned, or placed at a suitable location to estimate the noise exposure of one or more persons, stationary or otherwise.

'Sound level meter (SLM)' means an instrument consisting of a microphone, amplifier and indicating device, having a declared performance, and designed to measure a frequency-weighted and time-weighted value of the sound pressure level.

'Sound power' means the total sound energy radiated per unit time.

'Sound power level' means the relative magnitude of sound power, customarily expressed in decibels referenced to 1 picowatt.

'Sound pressure' means the alternating component of the pressure at a point in a sound field.

'Sound pressure level (SPL)' means the relative magnitude of sound pressure, customarily expressed in decibels referenced to 20 micropascals.

'Tinnitus' means ringing or other noises in the head or ears which can be caused by exposure to excessive noise. Tinnitus can become permanent and when severe may disrupt sleep, reduce concentration and lead to irritability and depression. Tinnitus may lead to increased absenteeism and decreased productivity. It can also affect general job satisfaction and contribute to adverse health effects, such as, stress.

'Tonal noise' means noise that produces in a listener a definite pitch sensation.

'Unweighted' means sound pressure levels or similar quantities that are measured using an instrument that responds equally to all frequencies, that is, it has a flat or linear frequency response. Sound pressure levels measured using this response are expressed in units of dB(lin).

'Workplace' means any place, including any aircraft, ship, or vehicle, where an employee works, or is likely to work, and includes any place where an employee goes while at work.

5. GENERAL PRINCIPLES

5.1 This *National Code of Practice for Noise Management and Protection of Hearing at Work* [NOHSC:2009(1993)] provides a framework for the management of exposure to noise at work and for minimising the risk of the effects of such exposure. It also provides guidance which will assist employers and employees to understand and conform with the *National Standard for Occupational Noise* [NOHSC:1007(1993)].

OBJECTIVES

5.2 The objectives of this national code of practice are to:

(a) minimise occupational noise-induced hearing loss and tinnitus by an approach that emphasises the reduction of noise levels at work by engineering noise control measures;

(b) promote the recognition and understanding of the effects of exposure to noise;

(c) promote the adoption of a systematic approach to the management of exposure to excessive noise; and

(d) promote implementation through established consultative processes.

STRATEGIES

5.3 The most effective approach for controlling occupational noise exposure is through the reduction of noise at source.

5.4 A comprehensive approach comprising risk identification, equipment and job redesign, training and education should be adopted to effectively manage the risk of noise-induced hearing loss and other noise-related health effects.

CONSULTATION

5.5 Consultation and cooperation between employers, employees and employee representative(s) and the free exchange of information pertaining to health and safety, are essential to the effective implementation of this national code of practice.

5.6 This national code of practice should be implemented by employers in consultation with employees and employee representative(s). This defines the consultation process referred to throughout the document.

5.7 Where they exist, occupational health and safety committees or representatives should review all existing processes involving exposure to excessive noise, and participate in the development of systematic programs of equipment and job redesign. The introduction of changes in the workplace or in job design should only occur following full consultation with employees and employee representative(s) through established consultative processes.

PROVISION OF INFORMATION

5.8 Information should be provided to employees, taking language and literacy into account, to familiarise them with:

(a) what noise is;

(b) the range of health effects due to noise;

(c) the social handicaps of noise-induced hearing loss and tinnitus;

(d) the exposures to noise in their particular workplace;

(e) the reasons for, and nature of, the general noise control measures which are used to protect them and other persons who might be affected by their work;

(f) the specific control measures which are necessary in relation to each employee's own job (these measures may include instruction in the correct use and maintenance of noise control equipment and correct methods of operation for minimising noise levels);

(g) the noise control policy and program of action and timetable for future improvements;

(h) the arrangements for reporting defects likely to cause excessive noise;

(i) when and how to use personal hearing protectors provided and their proper care and maintenance; and

(j) statutory responsibilities of employers and employees.

EMPLOYERS' RESPONSIBILITIES

5.9 The prime responsibility for ensuring that a safe working environment is established, and safe work practices are implemented and maintained, resides with the employer. Employers should ensure that:

(a) statutory requirements are complied with;

(b) a noise control policy and program of action are developed;

(c) all levels of management and employees are aware of the control measures to reduce exposure to noise;

(d) all employees are encouraged to cooperate in using agreed safe work practices;

(e) information on noise, the risks of exposure to noise and the appropriate control measures are disseminated in a manner appropriate to the workplace;

(f) a comprehensive personal hearing protection program, including the selection of personal hearing protectors, and instruction of employees in their correct use and maintenance, is implemented; and

(g) employees receive appropriate training and education when it is required.

5.10 Employers should recognise the supervisor's role in the management of noise and the protection of hearing at work and there should be close liaison between supervisors and employees.

EMPLOYEES' RESPONSIBILITIES

5.11 Employees should comply with all statutory requirements and established workplace procedures and cooperate, as far as they are capable, in all activities which have as their objective the protection of hearing at work and the minimisation of occupational noise-induced hearing loss.

DUTIES OF MANUFACTURERS, IMPORTERS AND SUPPLIERS OF PLANT FOR USE IN A WORKPLACE

5.12 Manufacturers, importers and suppliers should ensure that plant is designed and constructed so that its noise emission is as low as practicable when properly installed and used. Where necessary, research and development work should be carried out to reduce noise emission.

5.13 In deciding whether plant is likely to be noisy enough to require consideration of noise reduction, it will be necessary to take into account the range of uses for which it is sold, available information on the conditions under which it is likely to be used and the foreseeable methods of using it.

5.14 If operation of the plant is likely to create a noise hazard, the manufacturer, importer or supplier should ensure that adequate information is made available to the employer, if possible prior to the supply of the plant, about:

(a) its noise emission; and

(b) the means of installation, maintenance and use of the plant that will enable it to generate the lowest practicable noise levels.

5.15 Guidance for manufacturers, importers and suppliers on the presentation of information for noise levels generated by plant is provided in Appendix 1.

6. NOISE CONTROL PLANNING

6.1 The employer, in consultation with employees and employee representative(s), should develop a written noise control policy and program of action to implement noise control and manage exposure to noise. Copies of the policy and program of action should be available to all employees and employee representative(s) on request, and form a basic part of the information, induction and training activities.

POLICY

6.2 The noise control policy sets goals for the workplace in terms of noise exposure levels to be attained and the broad strategies to be used to meet them.

6.3 The policy should be reviewed at appropriate intervals and updated as necessary.

6.4 A noise control policy should cover the following issues, where they are applicable to the workplace concerned:

(a) goals for noise exposure and peak noise levels in existing work areas;

(b) design goals for new work areas (both for the building and plant);

(c) the selection and purchase of quiet plant;

(d) noise controls to be used in temporary work areas and situations;

(e) agreements with contractors in terms of responsibilities for noise control and provision of information;

(f) audiometric testing and availability of records;

(g) the funding for the noise control program; and

(h) the period of review of the noise control program.

PROGRAM OF ACTION

6.5 The specific steps in the program of action should be implemented in agreed timeframes. Steps to be implemented as a program of action include the following:

(a) assign a member of management to have overall responsibility for implementation and monitoring of the program;

(b) conduct a preliminary noise check to determine whether problems with exposure to noise are likely to exist;

(c) decide the type and detail of assessments to be carried out, the period between them and the persons carrying them out;

(d) develop a program for the selection of new or replacement plant which, where practicable, is likely to minimise exposure to noise;

(e) decide whether or not engineering noise control measures are practicable and the priorities to be given to different noisy situations;

(f) decide on suitable administrative noise control measures;

(g) select, provide and maintain suitable personal hearing protectors;

(h) identify, with the use of appropriate signs, hearing protection areas;

(i) provide on-going training and education to employees;

(j) provide voluntary audiometric testing;

(k) develop monitoring procedures which should include the following:

(i) check that measures used to control noise levels, such as silencers or enclosures, are maintained in good order and in position during the operation of noisy machines,

(ii) check, where necessary, the noise level to ensure that hidden defects are not causing high exposure to noise,

(iii) monitor the use of personal hearing protectors, and

(iv) check that hearing protectors are maintained in good condition; and

(l) maintain relevant records and make them available. (The records should be kept in a form easily understood by those likely to be exposed.)

7. ENGINEERING NOISE CONTROL MEASURES

NEW PLANT AND WORKPLACES

7.1 The purchase of new plant, the design of the area in which it is to be installed, and the design of new workplaces generally, provide opportunities for cost-effective noise control measures.

7.2 Invitations to tender for the supply of new plant should specify a maximum acceptable level of noise emission. If plant is to be purchased directly, without tender, noise emission data should be obtained from suppliers to enable the plant with the lowest practicable noise level to be selected. Guidance for manufacturers, importers and suppliers on the presentation of information about noise levels emitted by plant is provided in Appendix 1.

7.3 For guidance on interpreting suppliers' noise emission data, employers purchasing new plant can refer to the section 'Using Suppliers' Noise Information' in Module 8 'Buy Quiet' of the National Commission publication *Noise Management at Work: Control Guide* [NOHSC:12004(1991)][4].

7.4 New workplaces, and installation sites for new plant in existing workplaces, should be designed and constructed to ensure that exposure to noise is as low as practicable.

7.5 If new plant is likely to expose people in the workplace to excessive noise, design features should incorporate effective engineering noise control measures to reduce noise to as low a level as practicable.

7.6 Where plant is to be designed for a particular workplace, designers should:

(a) obtain agreement with the client on goals for noise, be aware of the noise control policy for that workplace and establish a budget that will allow for effective noise controls at the design stage;

(b) consider the effect on overall noise levels of building reverberation, the building layout and the location of workstations relative to plant;

(c) consider the transmission of noise through structures and ducts;

(d) design for acoustical plant rooms and control rooms where appropriate; and

(e) design acoustic treatments for external environmental control in a way that will reduce internal noise and vice versa.

EXISTING PLANT AND WORKPLACES

7.7 Once a noise assessment has been carried out and the necessity to reduce the noise exposure of employees is established, the task of controlling the noise can be addressed. Priority should be given to those noise sources which contribute to the highest noise exposures affecting the largest number of people. Noise exposure levels should be reduced to, or below, the *National Standard for Occupational Noise* [NOHSC:1007(1993)] wherever the national standard is exceeded. Even if the national standard cannot be met, any practicable reduction in noise levels should be carried out. Further reductions in noise levels should be carried out wherever practicable. The need for noise control should be taken into account when deciding on production methods or processes. There are two basic engineering noise control measures for controlling noise levels:

- engineering treatment of the source; and
- engineering treatment of the noise transmission path (including enclosure of the operator).

For guidance on comparing the effectiveness and cost of various noise control measures, refer to Module 9 'Evaluating Options' in the National Commission publication *Noise Management at Work: Control Guide* [NOHSC:12004(1991)][4]. For guidance on using in-house resources for noise control work, especially in the course of plant maintenance and modification, refer to Module 3 'In-house Control' in the same publication.

ENGINEERING TREATMENT OF THE SOURCE

7.8 Engineering treatment of the source is the preferred method of permanently removing the problem of noise exposure due to machinery or processes at the workplace. Since all noise-emitting objects generate airborne energy (noise) and structure-borne energy (vibrations), the treatment of these noise problems may require modification, partial redesign or replacement of the noise-emitting object. Subjective inspection or acoustical measurement of the device can identify how and where the noise is generated. Some problems can be solved by relatively inexpensive and simple procedures, although some are difficult. The advice from specialists may be beneficial in providing best results. This national code of practice includes reference to some of the simpler methods of noise control that might be achieved by management in the workplace.

7.9 When seeking a solution to a noise problem, an understanding of the operation of the machine or process is necessary in considering the possible treatment of the noise at source. Engineering noise control measures can be specifically targeted at the machine and its parts, or towards the actual processes, including material handling systems.

7.10 General noise control solutions, and examples of particular engineering noise control measures which can be carried out on machines, are provided below:

(a) Eliminate or replace the machine or its operation by a quieter operation with equal or better efficiency, for example, by replacing rivets with welds.

(b) Replace the noisy machinery by installing newer equipment designed for operating at lower noise levels. Machinery power sources and transmissions can be designed to give quiet speed regulation, for example, by using stepless electric motors. Vibration sources can be isolated and treated within the machine. Cover panels and inspection hatches on machines should be stiff and well damped. Cooling fins can be designed to reduce the need for forced airflow and hence fan noise.

(c) Correct the specific noise source by minor design changes. For example, avoid metal-to-metal contact by the use of plastic bumpers, or replace noisy drives with quieter types or use improved gears.

(d) A high standard of plant and equipment maintenance should be provided to facilitate compliance with the *National Standard for Occupational Noise* [NOHSC:1007(1993)], and reduce noise levels to as low as practicable. Badly worn bearings and gears, poor lubrication, loose parts, slapping belts, unbalanced rotating parts and steam or air leaks all create noise which can be reduced by good maintenance. Plant and equipment resulting in excessive noise levels should be repaired immediately.

(e) Correct the specific machine elements causing the noise by a local source approach, rather than by consideration of the entire machine as a noise source. For example, the addition of noise barriers, noise enclosures, vibration isolation mountings, lagging to dampen vibrating surfaces, mufflers or silencers for air and gas flows, or reducing air velocity of free jets. These may be considered as a solution for the individual noise-producing elements of the total operation.

(f) Separate the noisy elements which need not be an integral part of the basic machine. For example, move pumps, fans and air compressors that service the basic machine.

(g) Isolate the vibrating machine parts to reduce noise from vibrating panels or guards.

7.11 In addition to engineering changes to machinery and parts, processes can be modified to reduce noise. Specific means of modification include the use of processes which are inherently quieter than the alternatives, for example, mechanical pressing rather than drop forging. Metal-to-metal impact should be avoided or reduced, where possible, and vibration of the surfaces of the machine or the material being processed should be suppressed. This can be achieved, for example, by the choice of suitable materials, by adequate stiffness and damping or by careful dynamic balancing where high speed rotation is used.

7.12 Material handling processes, in particular, can also be modified to ensure that impact and shock during handling and transport are minimised as far as possible. This may be achieved by:

(a) minimising the fall height onto hard surfaces of items collected by tables and containers;

(b) fixing damping materials to, or stiffening, tables, walls, panels or containers where they are struck by materials or items during processing;

(c) absorbing shocks through the provision of wear resistant rubber or plastic coatings;

(d) using conveyer belts rather than rollers, which are more likely to rattle; and

(e) controlling the speed of processes to match the desired production rates, thereby obtaining a much smoother work flow and less likelihood of noise generation due to stop-start impact noise.

ENGINEERING TREATMENT OF THE NOISE TRANSMISSION PATH

7.13 If it is not possible to change or modify the noise-generating equipment or processes by engineering treatment of the source, engineering treatment of the noise transmission path between the source and the listeners, in this case the employees, should be investigated.

7.14 Engineering treatment of the noise transmission path includes isolating the noise-emitting object(s) in an enclosure, or placing them in a room or building away from the largest number of employees, and acoustically treating the area to reduce noise to the lowest practicable levels.

7.15 Alternatively, it may be desirable to protect the operator(s) instead of enclosing the sound sources. In this case, design of the sound proof room or sound-reducing enclosures should still follow the same principles.

7.16 The principles to be observed in carrying out engineering treatment of the noise transmission path are listed below:

(a) Distance is often the cheapest solution, but it may not be effective in reverberant conditions.

(b) Erect a noise barrier between the noise source and the listener, in some instances a partial barrier can be used to advantage. In cases where either area has a false ceiling, care should be taken to ensure that the dividing wall extends to the true ceiling and that all air gaps in the wall are closed and airtight.

(c) Once the acoustical barrier is erected, further treatment, such as the addition of absorbing material on surfaces facing the noise source, may be necessary.

(d) Materials which are good noise barriers, for example, lead, steel, brick and concrete, are poor absorbers of sound. The denser and heavier the material, the better the noise barrier.

(e) Good sound absorbers, for example, certain polyurethane foams, fibreglass, rockwool and thick pile carpet, are very poor barriers to the transmission of sound.

(f) Walls and machine enclosures must be designed to minimise resonances which will transmit acoustical energy at the resonant frequency to the protected area. This can be

achieved by placing reinforcement or bracing in strategic areas during construction or modification.

(g) Reduce, as far as possible, the reverberation of the room where noise is generated by the introduction of acoustically absorbent material(s). The presence of reverberation in a room shows the need for absorbing material. Excessive reverberation produces unpleasant and noisy conditions which can interfere with speech communication.

7.17 These principles can be utilised in the following way:

(a) using a sound-reducing enclosure which fully encloses the machine(s);

(b) separating the noisy area and area to be quietened by a sound-reducing partition;

(c) using sound-absorbing material on floors, ceiling and/or walls to reduce the sound level due to reverberation; and

(d) using acoustical silencers in intake and exhaust systems associated with gaseous flow activity, for example, internal combustion engine exhaust systems or air conditioning systems.

INSPECTION AND MAINTENANCE OF CONTROLS

7.18 A system should be established to ensure regular inspection and maintenance of vibration mountings, impact absorbers, gaskets, seals, silencers, barriers, absorptive materials and other equipment used to control noise.

8. ADMINISTRATIVE NOISE CONTROL MEASURES

8.1 Where it is not practicable to comply with the *National Standard for Occupational Noise* [NOHSC:1007(1993)] solely through engineering noise control measures, administrative noise control measures may also be used. Administrative noise control measures may include job rotation, job redesign or rosters which are designed so that as few employees as possible are exposed to noisy operations.

8.2 If administrative controls are relied on, there should be regular checks to ensure that they are fully and correctly complied with.

9. PERSONAL HEARING PROTECTORS

9.1 When engineering and administrative noise control measures do not reduce the exposure to noise below the *National Standard for Occupational Noise* [NOHSC:1007(1993)], employees should be supplied with, and wear, effective personal hearing protectors.

9.2 Personal hearing protectors should not be used when noise control by engineering or administrative noise control measures is practicable. They should normally be regarded as an interim measure while control of noise exposure is being achieved by these means.

9.3 The removal of personal hearing protectors for even short periods of time can significantly reduce their effectiveness and result in inadequate protection. Due to the difficulties of wearing personal hearing protectors for long periods of time in certain environments, regular brief periods in quiet areas, without personal hearing protectors, should be included as part of the personal protection program.

HEARING PROTECTION AREAS

9.4 Areas where persons may be exposed to noise levels exceeding the *National Standard for Occupational Noise* [NOHSC:1007(1993)] should be sign-posted as 'hearing protection areas', and their boundaries should be clearly defined. No person should enter a hearing protection area during normal operation, unless wearing appropriate personal hearing protectors. The signs used to identify these areas should conform with specifications laid down in Australian Standard AS 1319[2].

9.5 Additional signs within the hearing protection areas may also be necessary.

9.6 Where sign-posting is not practicable, alternative arrangements should be made in consultation to ensure that employees and others can recognise circumstances in which personal hearing protectors are required. Methods of achieving this include:

(a) attaching prominent warning notices to tools and equipment indicating that personal hearing protectors must be worn when operating them;

(b) providing written and verbal instructions on how to recognise circumstances in which personal hearing protectors are needed; and

(c) effective supervision of identified 'hearing protection areas'.

SELECTION OF PERSONAL HEARING PROTECTORS

9.7 It is important to ensure that personal hearing protectors will provide wearers with reliable adequate protection. Personal hearing protectors should conform with the specifications of Australian Standard AS 1270[5] and their attenuation should be measured in accordance with Australian Standard AS 1270[5]. Suppliers should be instructed to provide full information on the attenuation likely to be provided including the SLC_{80} ratings and octave band attenuation values. Suppliers' reports are to be made available to employees and employee representative(s). Additional information is available in the National Acoustic Laboratories' publication *Attenuation of Hearing Protectors*[6]. Information on calculating the protection required is provided in Australian Standard AS 1269[3].

9.8 Provided that adequate protection is given, it is preferable for the user to be allowed a reasonable choice from a range of personal hearing protectors.

9.9 Individual selection of personal hearing protectors should be based on:

(a) The degree of protection required in the employees' environment. Personal hearing protectors with unnecessarily high attenuation may cause communication difficulties and ultimately be unsuitable because of discomfort and inconvenience.

(b) Suitability for use in the type of working environment and the job involved. For example, ear plugs are difficult to use hygienically in work that requires them to be inserted with dirty hands. For such jobs, ear muffs might be better. On the other hand, ear muffs tend to be more uncomfortable in hot environments, or may make it difficult for the wearer to enter a confined space or to wear a helmet.

(c) The comfort, weight and clamping force of the hearing protector.

(d) The fit to the user. Individual fitting of the wearer is necessary for optimum protection. This should be checked while the user is wearing other regularly used items which might affect the performance of the protector. For example, spectacle wearers should be fitted with ear muffs while wearing their normal spectacles. Disposable plugs do not need individual fitting, but the ability of the material to conform to the user's ear canal should be taken into account.

(e) The safety of the wearer and fellow employees, for example, the suitability for use in conjunction with any other personal protective equipment that might be required, such as safety helmets or respiratory protective equipment. The wearing of personal hearing protectors should not mask warning sounds. The use of personal hearing protectors may make it more difficult for employees to hear sounds if they already have a hearing loss. Particular care may need to be exercised in such cases.

INSPECTION AND MAINTENANCE

9.10 Employers should ensure that personal hearing protectors are regularly inspected and maintained. Employees should also inspect personal hearing protectors regularly to detect and report damage or deterioration.

9.11 Adequate provision should be made for clean storage of protectors when not in use. Facilities should be readily available for the cleaning of reusable protectors.

9.12 For further information on inspection, maintenance and storage of personal hearing protectors, refer to the National Acoustic Laboratories' publication *Attenuation of Hearing Protectors*[6] or the National Commission publication *Noise Management at Work: Control Guide* [NOHSC:12004(1991)][4].

EDUCATION

9.13 Before personal hearing protectors are issued, the need for their use should be fully explained. Employees should be given guidance in the selection of appropriate personal hearing protectors. Instruction in their use, fitting, care and maintenance should be repeated at regular intervals. Employers, managers and supervisors should encourage the use of personal hearing protectors by explanation and personal example.

10. TRAINING AND EDUCATION

10.1 Training is an integral part of a preventive strategy, and is in addition to the provision of information outlined in Section 5.8 of this national code of practice. The target groups requiring training are:

(a) managers and supervisors of employees considered at risk of noise-induced hearing loss and tinnitus;

(b) employees who may be exposed to excessive noise at work;

(c) workplace health and safety committees and employee representative(s); and

(d) staff responsible for the purchasing of plant, noise control equipment, personal hearing protectors and for the designing, scheduling, organisation and layout of work.

TRAINING OBJECTIVES

10.2 The training objectives are:

(a) to minimise noise-induced hearing loss and tinnitus by an approach that emphasises engineering noise control measures;

(b) to recognise and promote an understanding of the nature of noise-related health effects, including the cumulative effects of occupational and other noise exposure such as domestic and leisure activities; and

(c) to promote the adoption of a systematic approach to the management of exposure to excessive noise.

PROGRAM CONTENT

10.3 The needs of each target group are different, and the content and methods of presenting training material should be tailored to meet the specific needs of each group.

10.4 Handouts, prepared as simple guidelines related to the needs of the group being trained, should be provided for all participants. The workplace policy and program of action should be readily available to all participants.

10.5 Advice on suitable publications is available from Worksafe Australia, State and Territory governments, and employer and employee groups.

10.6 Topics that should be included in a training program aimed at prevention of noise-induced hearing loss and tinnitus include:

(a) the effects of noise on hearing;

(b) the social handicaps of noise-induced hearing loss;

(c) the rationale for the *National Standard for Occupational Noise* [NOHSC:1007(1993)] (***see*** the Preface to this publication);

(d) the statutory responsibilities of employers and employees;

(e) an overview of the workplace noise control policy and program of action;

(f) the nature and location of noise hazards in the workplace associated with the technology, plant and/or work practices employees use in the course of their jobs;

(g) the nature of the general noise control measures which are in use or are planned;

(h) the specific control measures which are necessary in relation to each employee's own job. (As appropriate, this should include instruction in the correct use and maintenance of exhaust silencers, enclosures and other measures which minimise noise levels.);

(i) when and how to use personal hearing protectors provided, including selection, fitting, proper care and maintenance;

(j) the arrangements for reporting defects in plant or the workplace which are likely to cause exposure to excessive noise; and

(k) the purpose and nature of audiometric testing.

11. NOISE ASSESSMENTS

SCOPE

11.1 All workplaces where it is considered that employees may be exposed to noise exceeding the *National Standard for Occupational Noise* [NOHSC:1007(1993)] should be assessed, unless the exposure to noise can be reduced below the national standard immediately. Workplaces where noise exposure is marginally below the national standard should be re-assessed whenever any changes, which may increase noise exposure, are made.

11.2 As an informal guide, when it is necessary to use a raised voice in order to communicate with a person about one metre distant, it is advisable to carry out an assessment.

OBJECTIVES

11.3 The type and detail of assessments carried out will depend on how the information will be used. The general objectives of these assessments are to:

(a) Identify all employees likely to be exposed to noise above specified levels. This will generally involve the evaluation of $L_{Aeq,8h}$ and measurements of peak noise levels where relevant.

(b) Obtain information on noise sources and work practices that will help employers decide what measures should be taken to reduce noise.

(c) Check the effectiveness of measures taken to reduce exposure. (Provided that a base-line has been established in a more comprehensive assessment, it might be possible to restrict such surveys to measurement of noise levels at a few defined positions and under a restricted range of working or loading conditions of the equipment involved.)

(d) Help in the selection of appropriate personal hearing protectors.

(e) Delineate hearing protection areas.

11.4 The detail and accuracy needed will depend on individual circumstances.

11.5 The period between noise assessments should be determined by management in consultation with employees through established consultative processes. Assessment should be repeated at intervals not exceeding five years or whenever there is:

(a) installation or removal of machinery;

(b) a change in workload or equipment operating conditions likely to cause a significant change in noise levels;

(c) a change in building structure likely to affect noise levels; or

(d) modification of working arrangements affecting the length of time employees would spend in noisy workplaces.

11.6 Noise assessment records should be made in a consistent format and, where practicable, should be kept at or near the premises to which they apply. Where this is not practicable, for example, because of the itinerant nature of the work, such as construction work, the records should be kept available at a designated office. Assessment records should be made available to management, employee representative(s) and relevant authorities.

HOW TO CARRY OUT A NOISE ASSESSMENT

11.7 A noise assessment may be simple or quite complex, depending on the type of workplace, the number of employees and the information already available regarding noise exposure levels.

11.8 When no prior information is available, an assessment is made to establish if noise exposure is acceptable or not.

11.9 Where readings indicate that hearing protection is likely to be necessary, readings in dB(C) may also be taken during initial assessment in order to determine the attenuation required by personal hearing protectors. Alternatively, a separate follow-up assessment may be made for this purpose.

11.10 In some cases, more complex measurements are required in order to determine employees' noise exposure with acceptable accuracy, or for the selection of personal hearing protectors. For example, octave band analysis of the noise may be desirable if it contains intense tonal, high frequency or low frequency components.

11.11 More detailed guidance on noise measurement and recording is available in Australian Standards AS 1269[3] and AS 2659[7].

11.12 People employed to carry out a noise assessment should be competent and have adequate experience and knowledge of:

(a) the objective of assessments;

(b) the correct way of using instruments and their limitations;

(c) the analysis, interpretation and recording of results;

(d) the normal operating conditions of the workplace; and

(e) relevant Australian Standards and statutory requirements.

INSTRUMENTS

11.13 Sound level meters (SLM) have four principal grades of precision:

Type/Description	Tolerance
0 — Laboratory reference meter	± 0.4dB
1 — Precision	± 0.7dB
2 — General purpose	± 1.0dB
3 — Survey	± 1.5dB

11.14 Noise assessments should be performed with Type 2 general purpose meters, or better. Type 3 survey meters are usually inexpensive but may have wide precision tolerances and some models cannot be calibrated. Type 3 survey meters are only suitable for preliminary noise checks to find out whether more accurate assessments are needed.

11.15 The sound level meter may be equipped with an integrating function which enables the meter to process a continuous, variable, intermittent or impulsive signal to give a single integrated level or L_{eq} for the sampling period. A meter with this function is an integrating sound level meter (ISLM).

11.16 The sound level meter may have a peak detector-indicating characteristic. This is necessary to measure the peak sound pressure level. The peak sound pressure level should not be confused with the maximum sound pressure level.

11.17 Sound exposure meters (SEM), or noise dosemeters, can be worn by employees for a given period, for example, a working day. The SEM records the personal noise exposure of the employee. Some SEMs are capable of recording a time-history of an employee's noise exposure for the measurement period. A typical time-history report will provide a histogram of minute by minute noise exposure levels. This is a great advantage in identifying major contributors to the average daily noise exposure which can then be further investigated with a hand-held meter.

11.18 The following points should be considered when using a SEM:

(a) Reflection of sound from the clothes and body can cause an increase of about 1 - 3 dB.

(b) The microphone should be attached as close as possible to the ear. Other inappropriate positioning of the microphone may give higher or lower results. For example, if the microphone is attached to the lower part of the collar or pocket, it may be much closer to a noise source than the ear and an unduly high result will be recorded. Also, the body may shield a noise source.

(c) The assessment of exposure over just one day may not give a representative sample. If possible, it is best to take measurements over a few days.

(d) It is advisable to check the SEM results with a hand-held sound level meter.

(e) Some SEMs do not measure impulse sound adequately.

11.19 Sound exposure meters should comply with Australian Standard AS 2399[8] (except that the crest factor should exceed 10 if used for impulse sound).

11.20 All SLMs and ISLMs should comply with the specifications laid down in Australian Standards AS 1259.1[1] and AS 1259.2[9] respectively. Octave band filters should comply with the specifications laid down in Australian Standard AS Z41[10].

11.21 A full calibration of measuring systems should be performed at regular intervals not exceeding two years by a laboratory approved for the purpose.

11.22 Meters should be checked with an acoustic calibrator immediately before and after the measurements.

12. AUDIOMETRIC TESTING

12.1 The hearing of employees exposed to noise can be monitored through regular audiometric examinations. Such testing in itself is not a preventive mechanism, and is only relevant in the context of a comprehensive noise management program. Any changes in hearing levels over time revealed by audiometry should be thoroughly investigated as to their cause(s) and the need for corrective action.

12.2 An audiometric testing program should be available to any employee likely to be regularly exposed to noise exposure levels in excess of the *National Standard for Occupational Noise* [NOHSC:1007(1993)].

TESTING SCHEME

12.3 All testing should be undertaken by appropriately trained and experienced persons, selected by management in consultation with employees and employee representative(s).

12.4 People who carry out audiometric testing should ensure that procedures and equipment used are in accordance with the specifications of Australian Standard AS 1269[3].

12.5 The audiometric testing scheme should include an initial reference test with periodic audiometric testing to follow. The initial audiogram should be taken as soon as the employee commences work, or before any exposure to workplace noise occurs. Further audiograms should be taken at 12 months, and then periodically every one to two years.

12.6 Each employee's hearing, and the best type of personal hearing protectors for the job, should be discussed with that employee. Proper fitting of the personal hearing protectors should be ensured at the completion of the examination. Instructions on their use should be repeated at each subsequent attendance for audiometric testing.

12.7 Where significant hearing impairment is detected during the initial reference test, the employee should be requested to undergo a repeat test on a different day after at least 16 hours in quiet, less than 80dB(A), conditions. If the hearing impairment is confirmed at this second examination, it must be decided whether or not the employee should seek specialist audiological or medical advice. The test results and their implications should be made known to the employee tested. For further guidance, refer to the National Acoustic Laboratories' Report No. 80 *Criteria for Assessing Hearing Conservation Audiograms*[11].

TEST RESULTS

12.8 Audiograms should be assessed within two months of the audiometric test.

12.9 When the deterioration in hearing threshold level between the initial reference audiogram and any subsequent audiogram equals, or exceeds, 15 dB at 3,000 Hz, 4,000 Hz or 6,000 Hz, the employee should be referred for specialist audiological or medical advice, unless he or she has previously been referred for this loss. If the characteristics of hearing loss are consistent with exposure to noise, the employee's noise exposure and hearing protection should be checked. If, following referral, future audiograms reveal additional deterioration equalling or exceeding 15 dB at 3,000 Hz, 4,000 Hz or 6,000 Hz, the employee should be referred for further specialist audiological or medical advice.

12.10 When employees are found to have sufficient hearing loss to interfere with the safe performance of their jobs, all practicable steps should be taken to modify the work environment. Where this cannot remedy the situation, employees shall have the right of transfer.

12.11 Results should be given to employees within two months of the audiometric testing. All results should be accompanied by a written explanation, in lay terms, of their meaning and implications. Individual results should be released to other parties only on the written authority of the employee. Unidentifiable individual results and group data should be accessible to the relevant employer, the employee representative(s) and the relevant authority.

12.12 Guidance in the interpretation of audiograms is available in the National Acoustic Laboratories' Report No. 80 *Criteria for Assessing Hearing Conservation Audiograms*[11].

RECORDS

12.13 Audiometric test records of employees, where released to the employer, should be kept during the employee's period of employment and longer as necessary, as they may provide a useful reference for workers' compensation. The records should be kept in a safe, secure place and held as confidential documents.

GUIDANCE MATERIAL FOR MANUFACTURERS, IMPORTERS AND SUPPLIERS ON THE PRESENTATION OF INFORMATION ABOUT NOISE LEVELS GENERATED BY PLANT

INTRODUCTION

A1.1 The purposes of this guidance material are:

(a) To assist manufacturers, importers and suppliers in providing 'appropriate and adequate' information on noise levels generated by plant (*see* under the heading *'Appropriate and Adequate' Information on Noise* elsewhere in this appendix).

(b) To assist purchasers to make an informed choice when purchasing plant, by being able to assess and, where possible, compare suppliers' noise level information. This information will usually be obtained from tests under standardised conditions. The plant may, however, generate different noise levels in the workplace and it is the responsibility of the employer purchasing the plant to assess noise levels in the workplace. The purchase of plant should occur through the consultative mechanisms in the workplace, as part of a strategy to reduce noise levels in the workplace.

A1.2 The reasons for providing information on noise levels prior to purchase are:

(a) noise levels are a significant factor in making decisions on the purchase and hire of plant, since 'buying quiet' is a highly cost effective way to control workplace noise;

(b) providing the information 'up-front' encourages manufacturers to produce quieter products; and

(c) comparing noise levels will encourage local manufacturers and suppliers to move towards compatibility with information obtained/required overseas and in other parts of Australia.

'APPROPRIATE AND ADEQUATE' INFORMATION ON NOISE

A1.3 For information on noise levels to be considered 'appropriate' and 'adequate', it should be:

(a) Collected by a competent person according to good measurement practice as defined in relevant general international standards, or Australian Standards such as AS 2659[7]. This ensures a reasonable standard of accuracy.

(b) Presented in a clear, understandable format.

(c) Technically complete and unambiguous.

(d) Representative of noise likely to be emitted by plant under typical conditions of usage.

A1.4 The minimum testing information which should be supplied to the purchaser is listed in Table A. 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. The manufacturer/supplier should be able to provide a full test report when requested.

A1.5 Where there is a selection of noise measurement results available, the preferred measurement, for the purpose of this national code of practice, is the sound pressure level at the operator's ear position.

TABLE A: MINIMUM NOISE TESTING INFORMATION TO BE SPECIFIED BY THE MANUFACTURER/SUPPLIER

- **Supplier's details** (for example, name, local address, telephone and/or facsimile number).
- **Manufacturer's details** (for example, name, address, telephone and/or facsimile number).
- **Details of the plant tested** (including any noise controls, for example, make, model, serial number, relevant capacity/rating).
- **Title or number of specific test standard or code followed** (if any) and 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.
- **Details of operating conditions** 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.
- **Index measured** (for example, sound pressure or sound power).
- **Frequency weighting** (for example, A, C or linear).
- **Time weighting** (for example, L_{eq}, peak).
- **Sound level or levels determined in testing.**
- **Units of measurement** (for example, dB re: 20 micropascals).
- **Date issued.**

SUGGESTED PROFORMA FOR PRESENTATION OF INFORMATION ON NOISE LEVELS GENERATED BY PLANT

A1.6 A suggested proforma for the presentation of information on noise levels generated by plant is shown below. However, the information may be presented in any convenient way which will bring it to the purchaser's attention. For example, a catalogue or operating instructions would be suitable, provided the information is complete.

SUPPLIER/MANUFACTURER

Supplier:

Name .....

Address .....

.....

Phone ..... **Facsimile** .....

Manufacturer:

Name .....

Address .....

.....

Phone ..... **Facsimile** .....

DETAILS OF PLANT TESTED

Description of item

.....

.....

Make .....

Model ..... **Serial Number** .....

Noise reducing attachments fitted .....

.....

.....

TEST PROCEDURES

Operating conditions .....

.....

Test environment .....

.....

Test standard followed: Number ..... **Title** .....

.....

Clauses ..... **Departures from standard** .....

.....

Measurement method if no standard followed .....

.....

RESULTS

Measurement position .....

.....

Time weighting (fast, slow, L_{eq}) .....

	Range	Mean
A-weighted	..... to	..... dB(A)
C-weighted	..... to	..... dB(C)
Unweighted, peak	..... to	..... dB(lin) Peak

Sound power level ..... dB(A)

Date issued.....

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