

Noise in mining



Noise refers to unwanted or harmful sound that can have detrimental effects on health, well-being, and the environment. Prolonged exposure to high levels of noise can result in permanent and irreversible damage to hearing. The only effective management is to control noise exposure before hearing loss occurs, i.e. preventative measures.¹

Noise-induced hearing loss entails substantial economic costs. In addition, there is a reduction in quality of life for a person with severely impaired hearing. 1 in 6 Australians are affected by hearing loss and with an ageing population, this is expected to increase to 1 in 4 by 2050.

Noise-generating activities in mining

Noise is generated during mining activities such as:

- drilling and blasting
- extraction
- crushing and screening
- operating mobile plant
- two-way radios
- using pneumatic or electric equipment

The risk associated with exposure to noise produced by two-way radios is sometimes overlooked.



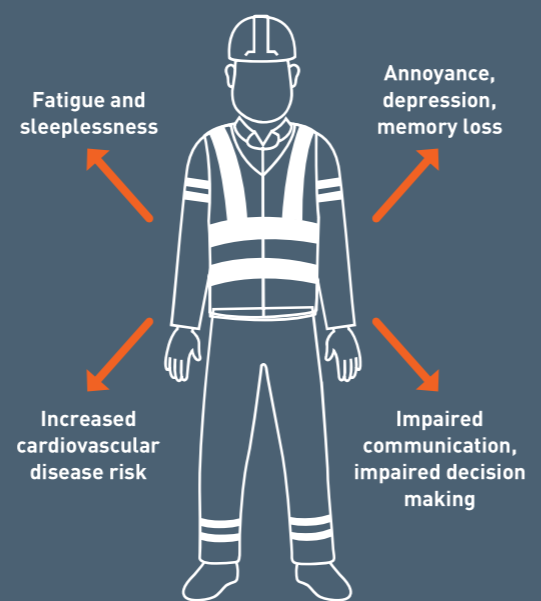
Health effects associated with noise exposure

Everyone loses some hearing as they get older, this is called presbycusis. However, workers exposed to excessive noise levels in the workplace have increased risk of developing the following adverse health effects²:

- noise induced hearing loss (NIHL)
- tinnitus
- temporary or permanent threshold shift

NIHL results when the inner ear becomes damaged following short term or long term exposure to excessive noise. It can occur quite quickly or deteriorate over time. Once it has taken effect, the damage is permanent.

Noise exposure can also cause a number of non-auditory health effects as described in the diagram opposite.



NON-AUDITORY EFFECTS OF NOISE EXPOSURE

Workplace exposure standard for noise

The Work Health and Safety (Mines) Regulations 2022, r56 outlines the workplace exposure standard (WES) for noise in Western Australian Mining Operations as follows³:

- L_{Aeq} of 85 dB(A)
- $L_{C, peak}$ 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 (using the WES in point a.) or be so loud that it causes immediate hearing loss (using the WES in point b.). The weightings of A and C are ways to have the raw electronic data better reflect what a worker will hear (humans do not hear very high or very low frequencies and so the weighting takes that into account).

$L_{Aeq, 8h}$ means the eight-hour equivalent continuous A-weighted sound pressure level in decibels. This is related to the total amount of noise energy a person is exposed to in the course of their working day, and normalises it back to an equivalent, standard 8 hour 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 can be expected to occur at $L_{Aeq, 8h}$ values above 85 dB(A).

$L_{C, peak}$ means the C-weighted peak sound pressure level in decibels. It usually relates to loud, sudden impact or explosive noise such as a gunshot or hammering. $L_{C, peak}$ values above 140 dB(C) can cause immediate damage to hearing. In addition, any noise above 140dB can not be managed by hearing protection as the sound will conduct through the bone to the ear drum.

Legislative requirements

In addition to the exposure standard for noise listed above, The Work Health and Safety (Mines) Regulations 2022, prescribes the following with respect to noise.

- R57, (1), noise must be managed, in accordance with Part 3.1, risks to health and safety relating to hearing loss associated with noise and r57 (2) the PCBU must so far as is reasonably practicable, ensure that the noise that a worker is exposed to at the workplace does not exceed the exposure standard for noise.
- R59 prescribes the duties of designers, manufacturers, importers and suppliers of plant with respect to noise emissions.
- R 675EA outlines the requirement for noise to be considered as part of the health management plan (HMP).
- Schedule 26 — Statutory positions part 2, outlines:
 1. that a Noise Officer must be appointed for a mine
 2. Noise Officer duties with respect to **(a)** noise surveys, **(b)** reporting, **(c)** advising mine management and the Senior Site Executive (SEE) on plant and activities that exceed the exposure standard and the processes and controls to reduce the noise emitted and **(d)** monitoring the noise personnel at a mine site are exposed to.
 3. Part 3 outlines the qualifications a Noise Officer must obtain in order to be appointed as a Noise Officer.
- R 58 outlines the requirements around audiometric testing.



Noise report and noise dosimetry sampling

Noise reports are required every five years until all exposures are below the action level, or whenever there is significant change in noise levels at a mine. A noise report must be prepared as soon as practicable, but not later than 12 months from the commencement of mining operations.



The report provides information on the typical noise exposure of all people at risk and outlines areas that contribute most to personnel over-exposure. It helps management to:

- decide what measures should be taken to reduce noise
- review the effectiveness of such measures.

Exposure to noise must be determined according to the procedures in AS/NZS 1269.1 Occupational noise management – Measurement and assessment of noise immission and exposure.⁴

Noise reports must be based on data collected by an approved Noise Officer using approved procedures and approved sound measuring equipment.

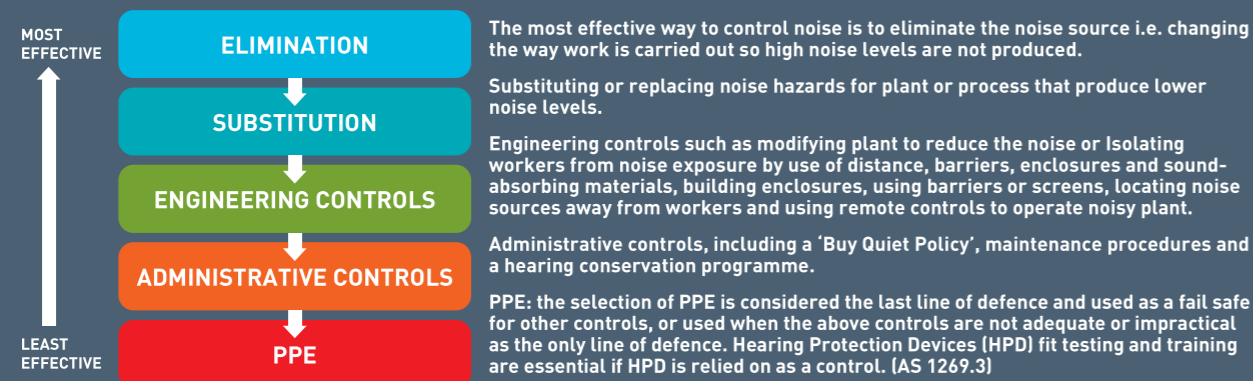
A noise control plan must be prepared and implemented within six months of completion of a noise report relating to a mining workplace. It is a written document listing the noise control treatments that have been decided upon, and a timetable for their implementation.⁵

The noise report for the mine can be supplemented by a noise dosimetry programme where personal noise dosimetry samples are taken from workers in the relevant similar exposure groups (SEGs). The noise dosimetry programme is usually described in the site HMP. Any noise dosimetry samples that return a result above the exposure standard will be subject to investigation with a review of the controls in place being conducted.

The noise report, noise control plan and noise dosimetry samples must be uploaded to the Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) Safety Regulation System (SRS) website.

Control measures

Controlling noise exposure must be implemented based on the hierarchy of controls as far as practical.



Audiometry



From 31 March 2024, regulation 58 of the Work Health and Safety (Mines) Regulations 2022 will come into effect requiring PCBU to provide audiometric testing for workers who are frequently required to use personal protective equipment (hearing protection) to protect them from the risk of noise induced hearing loss where their exposure to noise in the workplace exceeds the exposure standard.

Accordingly, a PCBU must provide audiometric testing for a worker within three months of the worker commencing work where hearing protection is required and regularly follow up at least every two years.

Ototoxins and vibration



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. Ototoxic chemicals include organic compounds.

Controls for ototoxins and vibrations should be implemented in line with the hierarchy of control to reduce the risk posed to as low as reasonably practical.



References

- 1 Safe Work Australia (2010) Occupational noise-induced hearing loss in Australia: Overcoming barriers to effective noise control and hearing loss prevention
- 2 Worksafe Western Australia (2022) Code of Practice, Managing noise and preventing hearing loss at work
- 3 Work Health and Safety (Mines) Regulations 2022
- 4 AS/NZS 1269 :2005 Occupational noise management
- 5 DMIRS (2014) Management of noise in Western Australian mining operations [Guideline]