



MORE NOISE – LESS HEARING

INTRODUCTION

Noise surveys, assessing noise exposure risks for WA mining employees, are undertaken during the first year of operations and every five years thereafter. All employees must be informed of the results of the survey and within six months a noise action plan must be implemented to control all noise exposures below the action level (LAeq8hr of 85dB(A)).

Personal noise exposure recordings are recommended to determine efficiency of controls for those occupations and tasks with noise levels above the action level. Some mines forward these results to Resources Safety, where they are entered into the MineHealth database.

The effects of noise exposure are measured by regular audiometry. This is undertaken for all WA mining employees at commencement of employment, and every five years, as part of the MineHealth surveillance programme. Since 2006, this data is also directly submitted to WorkCover WA, the workers' compensation regulator.

METHODS

Personal noise recordings submitted to Resources Safety have been analysed and compared with audiometry results submitted for MineHealth, using SAS. Noise exposures were collected according to Resources Safety's Procedure for Personal Noise Recordings (2005).

The term noise induced hearing loss (NIHL) is used to describe percent loss of hearing (PLH), corrected for presbycusis. It is calculated using the National Acoustic Laboratory (NAL) procedure outlined in NAL Report No. 118 (1988).

FINDINGS

Noise exposure

The following graphs are based on 12,705 personal recordings entered into MineHealth between 1996 and 30 June 2009.

Figure 1. Distribution of personal noise recordings, by occupation.

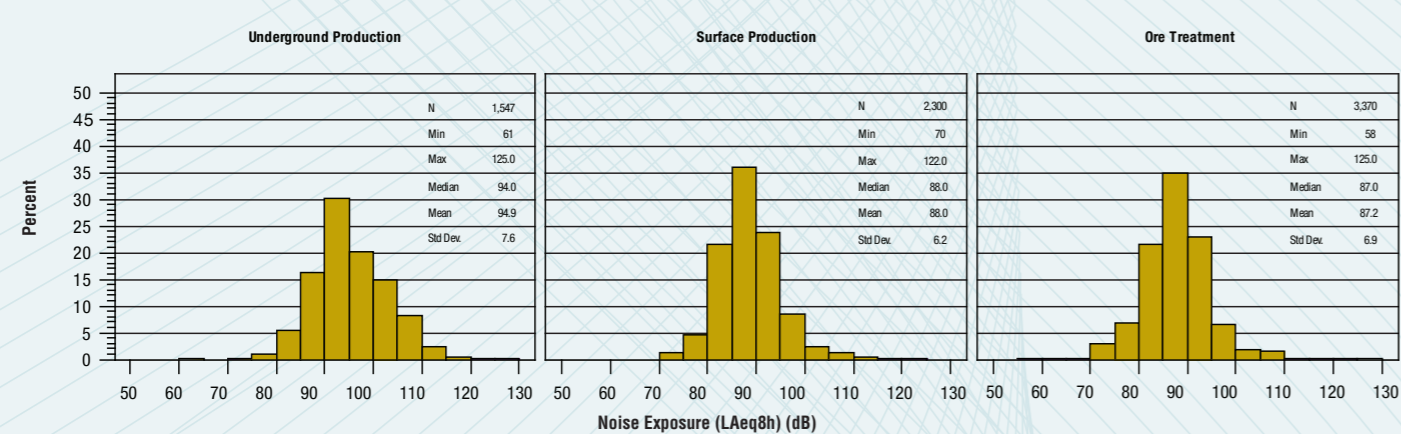


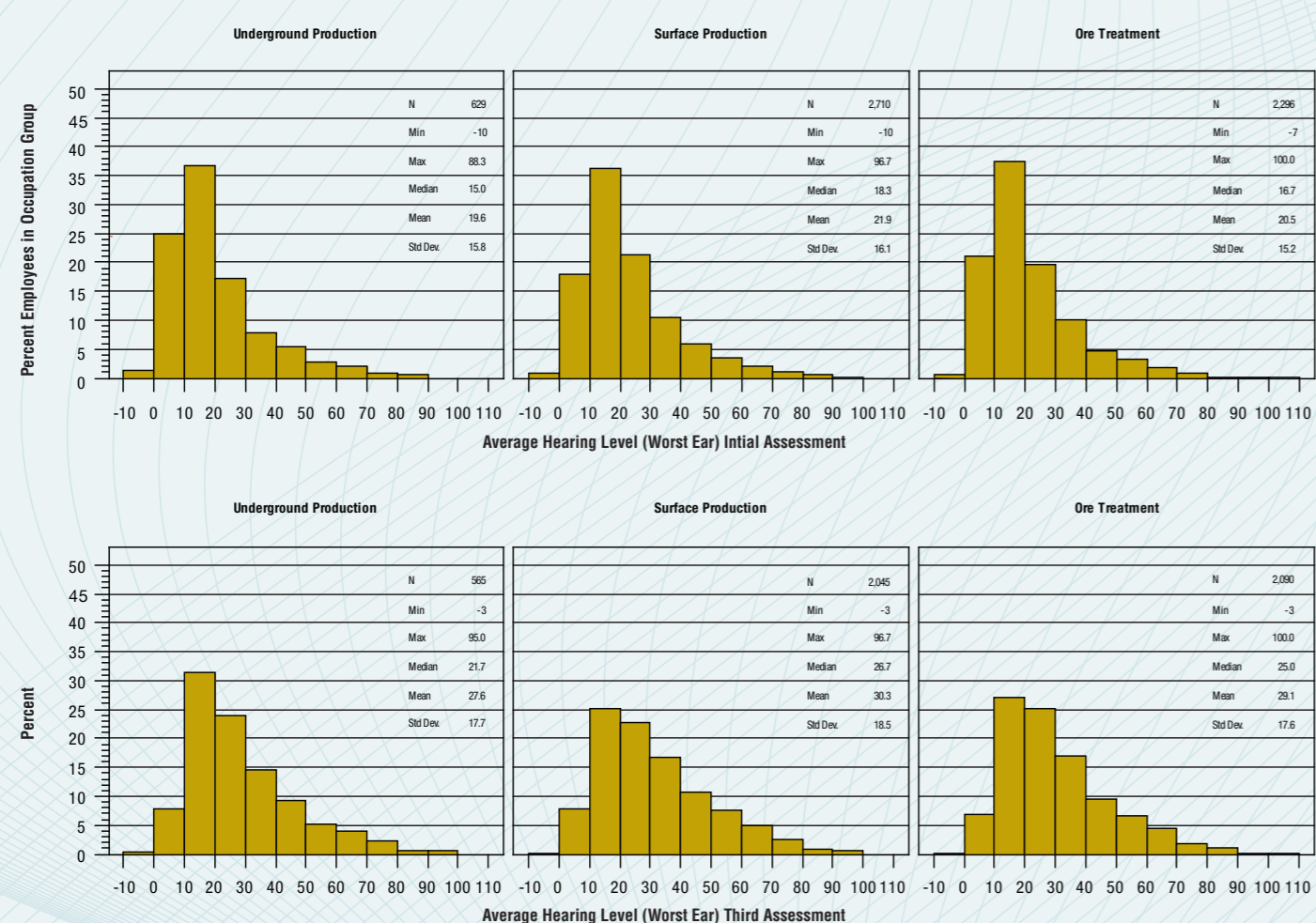
Figure 1 shows the distribution of noise exposures for underground, surface and ore treatment occupations. The proportion of personal noise exposure measurements above the action level of LAeq,8hr of 85 dB(A):

- 93.1% of underground production employees
- 72.5% of surface production employees and
- 68.2% of ore treatment employees.

The majority of employees in these occupations are exposed to extremely high levels of noise. This data indicates a heavy reliance on personal hearing protection as the primary control within the WA mining industry.

Hearing Loss

Figure 2. Distribution of average hearing levels at worst ear from audiometric zero (dB), by occupation at initial and third assessment.

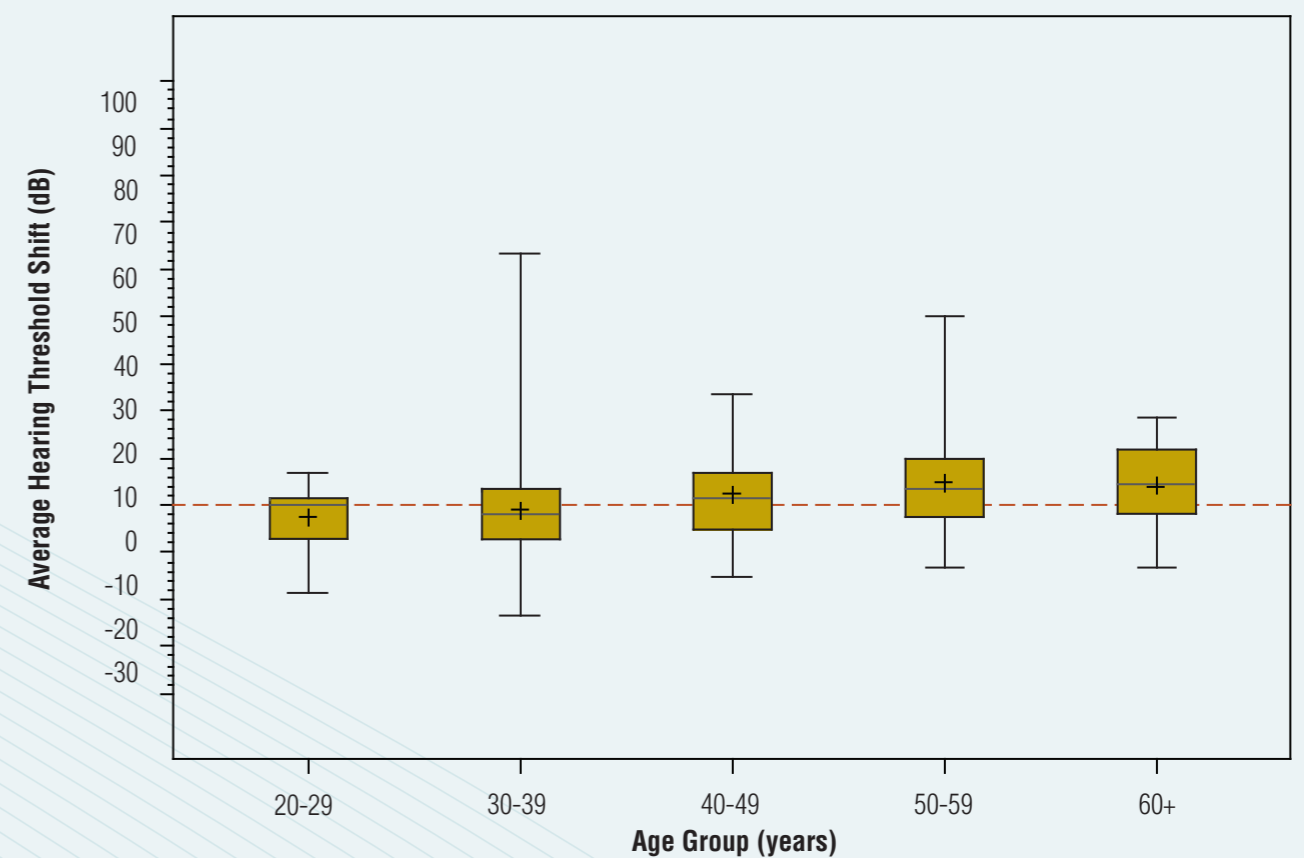


Legend: Average hearing levels represent the arithmetic mean of hearing threshold levels (HTL) at 2000, 3000 and 4000 Hz. The greatest value of both ears represents the worst ear.

Figure 2 shows that the proportion of people with healthy average hearing levels (less than 25 dB compared to audiometric zero) steadily declines from the first to the third assessment, with more people experiencing significant hearing losses over this time.

Not only do more people have a worse average hearing level, but the proportion with severe losses greater than 40dB is significant, suggesting that hearing conservation programs are not effective. Considerably more effort to control noise exposures is urgently required.

Figure 1. Average hearing threshold shift in underground production employees, by age



Legend: Dashed line indicates a significant change, or significant hearing threshold shift, of 10dB.

Figure 3 shows significant hearing threshold shifts from the age of 40 onwards demonstrating the accumulative effects of noise induced hearing loss. It also highlights the need to protect hearing with a greater emphasis on applying the hierarchy of controls.

Resources Safety recommends periodic review of hearing tests to detect early signs of hearing loss. Comparison against audiometric zero and with the baseline test is recommended.

Average hearing levels greater than 25dB from audiometric zero; or threshold shifts greater than 10dB between assessments, in either ear, averaged at 2000, 3000 and 4000 Hz are significant. They should trigger a complete review of all hearing exposures and conservation strategies, so effective controls can be implemented. During training and counselling of affected employees, both occupational and non-occupational noise exposures must be considered.

Table 1. Comparison of average hearing level, PLH and age corrected NIHL

Frequency (Hz)	HTL Left (dB)	HTL Right (dB)	PLH Left (%)	PLH Right (%)	PLH Binaural (%)
500	10	10	0	0	0
1000	10	10	0	0	0
1500	10	15	0	0	0
2000	10	30	0	2.1	0.7
3000	25	45	0.7	4.1	1.7
4000	40	60	1.5	3.6	1.9
6000	30	30	0.2	0.2	0.2
8000	30	30	0	0	0.0
Overall PLH (%) ¹			2.4	10	4.5
Overall NIHL (%) ²			1.8	9.4	3.9
Average hearing level	25	45			

Legend:

HTL: Hearing threshold level
1Uncorrected for age

PLH: Percent loss of hearing
2 Corrected for age for 59 year old male

Table 1 demonstrates the relationship between average hearing levels, PLH of individual ears with age corrected and non-adjusted binaural hearing loss. An average level of 25dB from audiometric zero, or 10dB from a previous test, is the recommended trigger level for a complete review of noise exposures to avoid the debilitating effects of cumulative hearing loss and compensation.

In WA 10% binaural hearing loss, corrected for presbycusis is compensable under the Workers' Compensation Act, 1981. In WA mining employees with three MineHealth assessments, the prevalence of compensable hearing loss is 4.9% at initial, 7.3% at second and 12.0% by the third assessment.

CONCLUSIONS

- Noise exposure recordings in WA mines are often well above the action level, suggesting that personal hearing protection is relied upon as the main form of control.
- Current noise controls appear to be ineffective in preventing severe hearing losses in mining employees, particularly in ore treatment, underground and surface production occupations.
- The cumulative effects of excessive noise exposure are observed as significant hearing loss from 40 years of age, suggesting more attention to prevention is required.
- A risk management approach to hearing conservation including identification, assessment, control and regular review of controls is essential to ensure healthy hearing.