ADJUSTMENT OF EXPOSURE STANDARDS FOR EXTENDED WORKSHIFTS

GUIDELINE

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ADJUSTMENT OF OCCUPATIONAL EXPOSURE STANDARDS FOR EXTENDED WORKSHIFTS

1.0 INTRODUCTION

Exposure standards for airborne contaminants have been developed for conventional workshifts, that is, **five consecutive eight-hour work days, followed by two days off**.

These standards may be inappropriate where there are altered or "unusual" or extended workshifts. To compensate for the extra hours worked, and hence the increased exposure period, and the reduced "recovery" period where there is no occupational exposure, a number of adjustment models have been developed.

There are three main models used in the adjustment of occupational exposure standards for extended shifts. These are:

- **Brief & Scala Model** Accounting for increased exposure time and reduced recovery time;
- **OSHA Model** Substance categorisation and application of a simple proportion based on either the daily shift length or work cycle; and
- **Pharmacokinetic Models** Using relatively complex formulas and substance specific biological data.

Each model has its advantages and disadvantages and applicability, depending upon the nature of the contaminant.

2.0 RECENT DEVELOPMENTS

There is scientific consensus that people working unusual or extended work shifts should be provided with at least an equivalent degree of protection to that afforded people working conventional work shifts. However, there is no scientific consensus on a universal exposure standard adjustment regime.

In June 1996, the National Health and Safety Commission proposed application of the Brief and Scala model in the first instance. For a 12-hour shift, this model derives an adjustment factor of 0.5 (i.e. halve the 8-hour time weighted average exposure standard).

While use of the Brief and Scala model may be appropriate for some substances, particularly substances that cause short-term respiratory irritation or narcosis, it is not appropriate for many of the metals and mineral dusts encountered in mining.

The model should also not be applied to the exposure standards established for inspirable or respirable dust, because these have been established based mainly on technological considerations rather than health effects.

To provide guidance to the industry for adjustment of exposure standards for extended workshifts, an adjustment regime has been developed for application in Western Australia. This Guideline outlines the strategies to be adopted in relation to occupational hygiene management and adjustment of exposure standards for extended workshifts.

3.0 EXPOSURE STANDARD ADJUSTMENT IN THE MINING INDUSTRY

Where extended workshifts operation within the Western Australian mining industry the following strategy should be applied with regard to occupational exposure standards.

1. Implement an appropriate exposure standard reduction regime where extended work shifts are used.

2. Pursue vigorously the ALARA principle – industry should ensure that worker exposure to atmospheric contaminants is reduced as far as practicable below occupational exposure standards.

3. No adjustment to PEAK or short-term exposure limit (STEL) exposure standards are required where extended shifts are used.

4. Use work cycle proportion for substances with chronic effects (as outlined in Table 1), such as the heavy metals and mineral dusts.

5. Use the Brief & Scala model for substances with medium term effects, such as the irritant gases and solvents.

6. Use the Brief & Scala model where there is uncertainty about the nature of the health effects.

7. Adopt internal management action levels at some fraction of the exposure standard (e.g. 30% or 50%) to trigger investigation and remedial action, if necessary.

The adjustment regime is outlined in Table 1 in the **Appendix**.

4.0 REFERENCES

Department of Minerals and Energy Western Australia, *Discussion Paper: Unusual Work Shifts and Occupational Exposure Standards*. J Oosterhof, 1993.

Worksafe Australia, Amendments to the Guidance Note on the Interpretation of Exposure Standards for Atmospheric Contaminants in the Occupational Environment. *Altered Workshifts*. January 1998.

APPENDIX

TABLE 1. RECOMMENDED EXPOSURE REDUCTION FACTORS FOR THE WESTERN AUSTRALIAN MINING INDUSTRY

EXPOSURE STANDARD	TIMEFRAME FOR ACTION	HEALTH EFFECT	TYPICAL SUBSTANCES	SHIFT ROSTER	EXPOSURE REDUCTION FACTOR
Peak	Fast - immediate	Acute poisoning	Cyanide, Caustic, Acid mists	n/a	**1**
STEL	Fast - immediate	Acute irritation	Nitrogen dioxide Sulphur dioxide Hydrogen sulphide Ammonia	n/a	**1**
TWA	Medium – within shift or over a few shifts	Respiratory irritation, narcosis	Solvents, Nitrogen dioxide, Sulphur dioxide, Hydrogen sulphide, Carbon monoxide	10 h/day	**0.7**
				12 h/day	**0.5**
TWA	Long – over many shifts or years	Cumulative poisoning, respiratory disease (silicosis, asbestosis), cancer	Silica, Asbestos, Nickel, Lead, Welding fumes, Talc, Inspirable dust, Respirable dust, Diesel fume	<170 h/mth	**1**
				> 170 h/mth	**170/*x****
TWA	Unknown or unsure			10 h/day	**0.7**
				12h/day	**0.5**

LEGEND

* x	Average number of hours worked in the month; 170 is the typical hours worked in a month for a normal 8 h/day, 5 day/week work cycle
STEL	Short Term Exposure Limit
TWA	Time Weighted Average Exposure Standard
n/a	Not Applicable
h	hours
mth	Calendar month