Safety and health management system elements and guidance for effective risk management of fatigue

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Introduction

Coal mines inspectorate investigations involving roster changes, contract arrangements and hours of work arrangements have highlighted some mine sites' lack of consideration of key elements in managing fatigue risks to an acceptable level, and ineffective risk management relevant to complex health and psychosocial hazards.

Changes to rosters or working arrangements

When changing rosters or working arrangements, or reviewing effectiveness of current procedures, site policies and procedures (e.g. change management) within the safety and health management system (SHMS), mine sites need to identify if changes to rosters, contract arrangements, operational arrangements and hours of work arrangements will potentially change the level of fatigue risk. The benchmark here is the interaction of all fatigue risk factors and control measures identified in QGN 16 *Guidance Note for Fatigue Risk Management* (https://www.dnrm.qld.gov.au/__data/assets/pdf_file/0004/240358/qld-guidance-note-16.pdf). Some examples are shown in Table 1 below:

Table 1: Direct risk factors

Direct risk factors have a direct influence on fatigue (a number of factors are inter-related, see information for each fatigue risk factor)

Direct influence on fatigue due to:

- ☑ direct effect on sleep opportunity and quality
- ☑ direct effect on extending wakefulness and increasing likelihood of onset of fatigue
- ☑ effect of known individual and personal factors influencing sleep quality or opportunity.

Risk factor 1: Number of consecutive night shifts Note: Night shifts will always carry more potential for fatigue, due to circadian rhythm.		
< 4 consecutive night shifts	4 consecutive night shifts	5 to 7 consecutive night shifts
Lower potential for fatigue	Medium potential for fatigue	High to extremely high potential for fatigue

Increase in higher order controls with increasing potential for fatigue

Controls for any period of extended night shifts require a comprehensive risk assessment

Risk factor 1: Controls		
Lower potential for fatigue	Medium potential for fatigue	High potential for fatigue
• Regular and frequent breaks • Optimal sleeping conditions for day sleep • Workload management and self pacing of work • Specific management of safety critical tasks • Journey plan / commute management • Comprehensive fatigue education for all workers	All of the previous column plus: • Journey plan / commute management to include the home journey after roster. Consider bussing or other arrangements • Restrictions on overtime and call-outs • Comprehensive supervisor fatigue training • Controlling other work environment hazards (heat, WBV, dust, etc)	All of the previous columns plus: • Well designed residential camp (see section on 'What is a well designed residential camp?') • Journey plan must limit driving time after roster – bussing may be an alternative or • Shorten last shift if DIDO • Increasing breaks (number, length and duration) • Break after roster should be equal to roster length for 7 nights, (<7 should be 80%) • No overtime or call-outs

Risk factor 2: Number of hours in a shift Allowances for unplanned overtime or call-outs extending hours are dealt with in risk factor 7. Night shifts specifically are discussed in Risk factor 1.		
8 hours worked in a single shift	>8-12 hours	> 12 hours
Lower potential for fatigue	Medium potential for fatigue	High to extremely high potential for fatigue

Increase in higher order controls with increasing potential for fatigue

Risk factor 2: Controls		
Lower potential for fatigue	Medium potential for fatigue	High potential for fatigue
• Comprehensive fatigue education for all workers	All of the previous column plus: • Workload management and self pacing of work • Specific management of safety critical tasks • Comprehensive supervisor fatigue training • Controlling other work environment hazards (heat, WBV, dust, etc) • Restrictions on overtime and call-outs	All of the previous columns plus • allow 10 hours for sleep, wind down and recovery Additional controls during the shift • Regular and frequent breaks • Sufficient resources to allow for all workers to have necessary breaks particularly on nightshifts Additional controls after the shift • No overtime and call-outs • Limits on driving time after a series of 12 + hour shifts

If changes to site arrangements could impact fatigue or fitness for work, the site is expected to trigger change management processes and undertake a fatigue risk assessment process complying with site senior executive obligations under the *Coal Mining Safety and Health Act 1999* (CMSHA), and specific requirements under the *Coal Mining Safety and Health Regulation 2001* (CMSHR), sections 10 (3) and 42.

Section 10(3) requires that in developing the standard operating procedure, the site senior executive must:

a) use a risk assessment process recognised by the mining industry as an acceptable process for identifying and controlling hazards; and
b) have regard to the methods of controlling the hazard stated in the database kept by the chief executive under the CMSHA section 280(1)(a)(i).

A concern is that sites are not meeting their obligations under the CMSHA, section 30(2)(d). Section 30(2) stipulates that the systems must incorporate risk management elements and practices appropriate for each coal mine to:
a) identify, analyse, and assess risk; and
b) avoid or remove unacceptable risk; and
c) monitor levels of risk and the adverse consequences of retained residual risk; and
d) investigate and analyse the causes of serious accidents and high potential incidents with a view to preventing their recurrence; and
e) review the effectiveness of risk control measures, and take appropriate corrective and preventive action; and
f) mitigate the potential adverse effects arising from residual risk.

Many sites have no specific methods to identify fatigue contributing factors in investigations of serious accidents and high potential incidents.

Coroner's inquiry into the deaths of Graham Brown, Malcolm Mackenzie and Robert Wilson

As part of fatigue risk management practices, coal mines need to consider relevant recommendations from the Coroner's inquest into the deaths of Graham Brown, Malcolm Mackenzie and Robert Wilson, (http://www.courts.qld.gov.au/__data/assets/pdf_file/0005/86576/cif-mackenzie-m-brown-p-wilson-r-20110223.pdf) including the following:

- Recommendation 15

  'That the Mines Inspectorate investigate:

  (a) the implementation of a fatigue management Recognised Standard incorporating a workable definition of fatigue including consideration of parameters for maximum number of hours in a day, a week and a shift cycle; and if so then
  (b) enforcement powers be implemented either within a statutory framework or the employment contract or both to ensure compliance with the fatigue management standard on the shoulders of the employer and the employee.'

  This recommendation highlights that fatigue is considered a joint responsibility, and procedures cannot only focus on worker (or contract/labour hire employee) 'self-management'.

- Recommendation 17

  'That mine operators fully explore control measures to reduce or eliminate the risks associated with workers commuting whilst fatigued.'

  This highlights that Mine operators are expected to consider a range of control measures to reduce or eliminate the risks associated with workers commuting whilst fatigued, with cumulative fatigue from consecutive night shifts a particular area of concern for the commute home.

- Recommendation 18

  'That the Mines Inspectorate sponsor, in conjunction with the Queensland Resources Council and the CFMEU, targeted research at both the industry and mine level into shiftwork fatigue risk management and commuting to ensure risk is at an acceptable level.'

  This recommendation has resulted in published, peer reviewed research showing that fatigue risk on the roads can be affected by the distance of the journey after working night shifts, the number of consecutive night shifts worked, and hours of sleep prior to driving.

Both the inquest findings and Queensland Guidance Note QGN16 Fatigue risk management are referenced in the Mining Hazards Database at https://www.business.qld.gov.au/industries/mining-energy-water/resources/safety-health/mining/hazards/hazards

Administrative procedures.

Many sites have introduced journey management plans into their commuting related fatigue risk management. Over-reliance on administrative procedures is of concern in managing the overall risk of driving more than 2 hours (or 150 km) after a series of night shifts. Sites must understand the profile or

risks involved for workers driving after extended periods of night shifts, and incorporate this into the risk assessment. Recent Supreme Court decisions may be of relevance in determining the view of the courts in driving after a series of night shifts.

Fatigue risk assessments

Sites need to allow appropriate time and resources when undertaking fatigue risk assessments and reviews, and ensuring the risk assessment representation considers those operational areas most at risk of fatigue related incidents. For most sites, this will be those operational areas involving mobile equipment operation (particularly monotonous work) and rosters involving more than 4 consecutive night shifts. Many sites also miss that driving buses or transporting workers is a particular operational role that is of extremely high fatigue risk, as there is potential for multiple fatalities if the driver is affected by fatigue.

Labour hire and contractors

Based on concerns raised to the Mines Inspectorate, as well as analysis from HPI reporting, there will be a greater focus on working arrangements of labour hire and contractors with regards to fatigue. Sites should review their contract arrangements to determine there is sufficient emphasis on commute distance, breaks between and after rostered time of labour hire employees and the accommodation arrangements for contract and labour hire employees.

Recommendation

It is strongly recommended sites review the above elements to ensure that the SHMS is managing fatigue risk to an acceptable level, and they are monitoring and reviewing the effectiveness of the systems in place. Coal mines will shortly be receiving a self-assessment survey on these elements to determine their capacity for dealing with the complex issue of fatigue risk management.

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