NSW GOVERNMENT

NSW Resources Regulator

TARGETED ASSESSMENT PROGRAM

FINAL CONSOLIDATED REPORT – MANAGING FATIGUE RISKS IN UNDERGROUND METALLIFEROUS MINES

March 2020

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Contents

Executive summary

This report summarises the findings of the targeted assessments program (TAP) undertaken at ten underground metalliferous mines across NSW between June 2019 - November 2019.

Mine operators are required to manage the risk of worker fatigue in accordance with clause 43 of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014.

The program identified that mine operators generally relied on administrative controls to manage worker fatigue, however some had implemented higher order controls, including engineering controls such as sleep and alertness tracking devices worn by workers to measure their fatigue levels throughout a shift. Another control was site entry management systems, where the time workers spent onsite was tracked and workers were sent home if they exceed their hours as prescribed in the site's fatigue management plan (FMP). One operation used the higher-level control of substitution for worker commuting by busing workers to and from the mine.

As fatigue tracking and remote operating technologies develop and a better adapted for underground environments mine operators should keep informed of these developments and consider their implementation when it is deemed to be reasonably practicable to do so.

With fatigue management largely reliant on administrative controls, for these controls to be effective workers need to be adequately trained in the risks that fatigue poses to their health and how it is best managed. The TAP identified notable discrepancies between operations with regard to training. Some operations provide a day-long course in fatigue to all workers, while others provided limited training beyond a brief mention of fatigue in the worker induction. It is recommended that all workers be provided with detailed training regarding fatigue, as management is very reliant on worker self-management.

Encouragingly, all workers interviewed during the TAP indicated there were no pressure from supervisors when they reported feeling fatigued. If they needed a change of duties, a break, or even to be taken home, this would be supported by their supervisor. However, production pressures are only one aspect of fatigue. A worker's home life, commute distance and general health are also important factors of a worker's susceptibility to suffering from fatigue. It was found some mines did not consider worker commute in their fatigue risk assessment. It is recommended that a requirement for workers to complete travel plans are implemented at all mines, so workers adopt a systematic approach to arrive to work/home in an alert state.

There were several improvement notices issued to mine operators around the issue of worker commute. Notices were also issued regarding the use of contractors, who at some sites were found to be working under FMPs that were not consistent with the mine operators plans, which was considered a contravention of clause 22 Work Health and Safety (Mines and Petroleum Sites) Regulation 2014.

Background

The targeted assessment program (TAP) provides a planned, risk-based and proactive approach to assessing how effective an operation is when it comes to controlling critical risk. TAPs apply the following principles:

- a focus on managing prescribed 'principal hazards' from the WHS (MPS) Regulation
- evaluation of the effectiveness of control measures implemented through an organisation's safety management system
- consideration of the operation's risk profile and the targeting operations considered to be highest risk.

The objective of the risk profiling is to identify the inherent hazards and the hazard burdens that exist at individual operations in each mining sector in NSW. The information is used to develop the operational assessment and inspection plans that inform the program.

Each TAP is undertaken by a team of inspectors from various disciplines, such as electrical and mechanical engineering, who work together with the operation's management team to undertake an assessment of the control measures associated with the relevant hazard and their implementation.

Scope

The scope of the targeted assessment includes two elements:

1. a desktop assessment of:
    - compliance against legislation with respect to the management of risks to health and safety associated with fatigue at the mine
    - controls the mine uses to prevent and mitigate the risks to health and safety associated with fatigue
    - means the mine uses to monitor the effectiveness of those controls.
2. a workplace assessment of the implementation of those controls.

The process

The process for undertaking a TAP generally involves the following stages:

- preliminary team meetings, preparation and review of documents
- execution of an on-site assessment involving:
  - a site desktop assessment of relevant plans and processes measuring legislative compliance of the relevant plans
  - the inspection of relevant site operations.
- discussion and feedback to the mine management team on the findings and actions that need to be taken by the operators in response.

Managing fatigue risks in underground metalliferous mines

Mine operators are required to manage the risk fatigue poses to workers. This requires mine operators to conduct a risk assessment as per clause 43 of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 and detail how fatigue will be managed within the mine's health control plan [Schedule 2 (1)(b) Work Health and Safety (Mines and Petroleum Sites) Regulation 2014]. Mine operators also need to provide worker training relating to fatigue, including all the control measures used by the operation to manage it [clause 104 Work Health and Safety (Mines and Petroleum Sites) Regulation 2014].

Worker fatigue levels are affected by several factors, including home life, commute distances to work, diet, amount of exercise performed, rostering, hours of work, the duties performed and the work environment.

Assessment findings

The findings of this assessment are grouped into the following categories:

- **General findings** can be used to inform all aspects of an operation's safety management and provide valuable information and insight across all sectors and operation types.
- **Specific findings** should be used to inform and improve safety management systems to address this principal hazard.
- **Areas of good practice** observed during targeted assessments that may provide guidance for all mines.

General findings

Risk assessment

Issue: Risk assessments for fatigue were not conducted by a person who was familiar with the nature of the hazard in relation to the particular mine site. While some operations had engaged experts in sleep science in the risk assessment that supports the FMP, other operations used onsite staff who were given no training in fatigue beyond PowerPoint slides in their induction.

Response: The mine operator must ensure that a risk assessment is conducted by a person who is competent to conduct the particular risk assessment having regard to the nature of the hazard [clause 9(2) WHS (MPS) Regulation].

Issue: When determining hours of work as a control to manage worker fatigue, these hours of work need to be determined via the use of a recognised standard.

Response: Mine operators should consider engaging expert advice in the risk assessment and use this advice to determine the hours of work. In the absence of expert advice being available, mine operators should seek to determine worker hours via the use of a recognised bio-mathematical model.

Issue: The fatigue risks associated with a mine's roster arrangements had not been assessed against the control measures identified in the safety management system. The roster arrangements also need to consider commuting times, call outs and overtime.

Response: Mine operators need to consider worker commuting times, not just going to and from work, but commuting times before and after their roster begins. Hours of work need to consider workers who are subject to call outs and who work overtime. Hours of work should be determined using a recognised bio-metric model and the mine should have a method of recording and enforcing hours of work. Any controls developed must be implemented for all workers at the mining operation – including contractors.

Information, instruction and training

Issue: Mine operators had not provided training to workers before they participated in the risk assessment for fatigue.

Response: The mine operator must ensure that workers participating in a risk assessment are provided with adequate information, training and instruction to enable them to effectively participate in the development and implementation of strategies to protect workers at the mine from risks to health and safety arising from fatigue [clause 104(2)(e) WHS (MPS) Regulation].

Issue: All mines identified the use supervisors to monitor worker fatigue as a control within their risk assessments and FMPs, however some supervisors reported they were unaware of this responsibility and had a limited understanding of how fatigue affects human health.

Response: Mine operators must provide fatigue management training and instruction to all workers, including supervisors, in accordance with clause 104(2)(b) of the WHS (MPS) Regulation. All mine operators relied on supervision as a control in FMPs. Supervisor interaction with workers was identified as a key element in monitoring workers for fatigue. For supervisors to be effective in performing this monitoring function, effective training is essential.

Issue: Mine operators had not reviewed the information, training and instructions on managing fatigue for supervisors.

Response: Mine operators must ensure that information, training and instructions provided to workers is reviewed and as necessary, revised, to ensure that they remain relevant and effective [clause 107 WHS (MPS) Regulation].

Issue: Mine operators rely heavily on a workplace culture of self-reporting, to manage the risk of worker fatigue.

Response: Every worker interviewed reported feeling comfortable self-reporting their fatigue and working with their supervisor to manage their fatigue with strategies such as having a coffee break, changing duties, having a power nap, all the way through to being driven home after their shift.

Issue: Worker fatigue is reduced through a number of strategies, including optimising the worker's sleeping environment, diet, exercise regime, consumption of drugs and alcohol and general levels of stress in their lives.

Response: As worker fatigue levels are affected by a multitude of factors, a whole-of-lifestyle approach is required. It is recommended that not just workers, but worker families be given education in fatigue management and how to create the best home environment for workers to reduce their risk of becoming fatigued. It is also recommended that random fatigue assessments be conducted on workers, the same way random drug and alcohol tests are conducted.

Specific findings

Fatigue management plans

Issue: Mine operators identified control measures in their plans however failed to implement and/or review the control measures for fatigue consistently across the mine site.

Response: The implementation, maintenance and review of fatigue-related control measures must be consistently applied across all areas of the mine site, including the preparation plants, workshop and maintenance areas, as per clause 37 WHS Regulations 2017.

Issue: Mine operators did not have systems in place to monitor contractors' compliance with the FMP.

Response: Contractors were not always effectively monitored. Hours of work and roster patterns of itinerant contract workers were not considered in monitoring. Operators must have systems in place to monitor compliance with the FMP for all workers on site, including contractors [clause 22 WHS (MPS) Regulation 2014].

Issue: Some mines had inadequate processes to ensure the hours of work prescribed in the mine's FMP were being complied with by workers.

Response: Mines should consider the use of higher order controls, rather than purely administrative controls to monitor hours worked. Mines should consider pre-programmed card swiping systems that monitor the time a worker spends on site and alarms when there is a breach (clause 36 WHS Regulation 2017).

Emerging technologies

Issue: Some mine operators were adopting technologies to track worker alertness levels and using automated systems to determine worker fatigue levels.

Response: Mine operators are required to manage the risk fatigue poses to workers as far as is reasonably practicable. Some mines have swipe access controls already at their operations, with workers swiping in and out, to record their time. It is recommended that mines with this facility upgrade it, so that an alarm is automatically triggered when people work for periods longer than what is stated in the operation's FMP.

As technological controls continue to improve in monitoring and manage worker fatigue, mine operators must remain informed of these technological updates and seek to implement these controls, as they become reasonably practicable (clause 36 WHS Regulation 2017).

Journey management plans

Issue: A mine operator had not implemented journey management plans for workers in accordance with the FMP.

Response: Where journey management plans are identified as a control measure for workers (e.g. workers travelling more than one hour to and from the mine site), operators must ensure that plans are implemented and confirmed. Some workers were identified throughout the TAP who had not completed a journey management plan, despite this being company policy (clause 37 WHS Regulation 2017).

Employee medicals

Issue: There was a large amount of variability in how worker sleep issues were identified. Some medicals included detailed questioning of a worker's sleep patterns and if necessary, workers were referred for sleep studies. Other medicals did not include specific questions around worker sleep patterns.

Response: The individual nature of how fatigue affects a worker's health, means worker medicals can provide further insight into a worker's likelihood to suffer from fatigue. Worker health assessments should include questions around the worker's lifestyle and sleeping patterns. If the

assessment identifies issues regarding the worker's sleep patterns, then the worker should be given training and advice on how to optimise their ability to rest when not at work.

Areas of good practice

Some mines identified fatigue as the single biggest risk to worker health and safety at their operation. This prompted the operations to engage medical experts in fatigue to participate in fatigue-related risk assessments and for mines to conduct a broad review around available controls for fatigue. Some mines conduct annual medicals with specific questions around fatigue. They also conduct a medical three months after a worker has commenced at the operation to check how they have adjusted to working shift work. In these medicals, literature for the worker's immediate family is provided to optimise the worker's home environment to gain adequate rest.

Mine operators' use of fatigue monitoring devices was another area of good practice, where they wear a watch-like device that monitors a worker's alertness levels 24-hours a day. This allows workers to understand at what periods of the day their fatigue levels increase, how much sleep they are getting and gives feedback for aspects of their home and work environment that could be improved.

Two mines have budgeted to implement a real time monitoring system for truck drivers, where a series of scaled alerts are issued when a driver becomes fatigued. Such devices were found to be effective in the surface coal fatigue TAP program. The communication systems required to use such devices makes their implementation more difficult in the underground environment, however two mines have committed to their implementation. It is hoped that the results of their use in underground metalliferous mines is widely reported across industry.

Several mines have fatigue rooms available, where workers can go to sleep at any time. Similarly, for the management of fatigue when commuting between rosters, mines made rooms available for workers to sleep before starting their commute.

Compliance

Notices were issued by assessment teams in response to the following identified compliance issues.

Notice	In relation to
Improvement notices, s191 Section 191, *Work Health and Safety Act 2011*	■ People working more than 14 hours, in breach of the fatigue management plan. ■ Workers had not submitted commute plans as required by the mine's FMP. ■ Workers not complying with their journey management plans ■ Supervisors not trained in the FMP and how fatigue affects human health. ■ The implementation and review of control measures for minimising the risk that a worker will be exposed to fatigue were not consistently applied across the mine site. ■ The mine operator has not engaged a competent person in the development of the risk assessment.
Notices of concern, s23 Section 23, *Work Health and Safety (Mines and Petroleum Sites) Act 2013*	■ The mine has not updated its risk assessment for fatigue when roster changes were made. ■ Concerns around the level of worker training in how fatigue effects human health. ■ Workers were not provided the results of fatigue monitoring devices.

Where to now

Publishing this report provides all operators with an opportunity to review their own safety management systems armed with the insight and knowledge gained by the assessment team regarding managing fatigue.

The outcomes of these targeted assessments will provide information that will be used to inform our ongoing education and compliance efforts.

This targeted assessment program has identified many common issues around the approach taken by sites to manage worker fatigue. It also highlighted broader issues that are common across mine sites

associated with the process of developing, implementing and reviewing risk assessments, management plans and procedures.

Operations should be challenging their control measures and ensure risks are being managed as technologies emerge, as far as is reasonably practicable. Mine operators should also ensure they have robust systems in place to verify the effectiveness of their risk control measures.

Issued by

Garvin Burns
Chief Inspector of Mines
NSW Resources Regulator
Department of Regional NSW

Further information

For more information on targeted assessment programs, the findings outlined in this report, or other mine safety information, please contact the Resources Regulator's Mine Safety branch. You can find the relevant contact details below.

Type	Contact details
Email	cau@planning.nsw.gov.au
Incident reporting	To report an incident or injury call **1300 814 609**
Website	resourcesregulator.nsw.gov.au
Address	Resources Regulator 516 High Street Maitland NSW 2320

Appendix A: Legislative requirements and published guidance material relating to the management of fatigue risks

The following is a list of certain legislative requirements for the management of fatigue-related risks referred to in this report as provided by the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 and Work Health and Safety Regulation 2017.

Legislation, section/clause	Legislative requirements
WHS (MPS) Regulation, clause 9	Management of risks to health and safety
WHS (MPS) Regulation, clause 10	Review of control measures
WHS (MPS) Regulation, clause 22	Contractor to prepare plan or use safety management system
WHS (MPS) Regulation, clause 43	Fatigue
WHS (MPS) Regulation, clause 104	Duty to provide information, training and instruction
WHS (MPS) Regulation, clause 107	Review of information, training and instruction
WHS (MPS) Regulation, clause 121	Preparation of principal hazard management plan
WHS Act, section 19(3)(c)	Primary duty of care
WHS Act, sections 47-49	Consultation with workers
WHS Regulation, clause 36	Hierarchy of control measures
WHS Regulation, clause 37	Maintenance of control measures
WHS Regulation, clause 38	Review of control measures
WHS Regulation, clause 39	Provision of information, training and instruction

Legislation, section/clause	Legislative requirements
WHS Regulation, clause 51	Managing risks to health and safety

The following published guidance material may assist mine operators to manage risks associated with fatigue:

Fatigue management – Guidance for the NSW mining and petroleum industries (NSW Resources Regulator)