NSW Resources Regulator

MINE SAFETY TARGETED ASSESSMENT PROGRAM

Fatigue management practices – NSW coal mines

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Executive summary

The targeted assessment program (TAP) commenced in March 2016 providing a planned, intelligence-driven and proactive approach to assessing how effectively mine operators are managing the principal hazards defined in the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 (WHS (M&PS) Regulation).

This report summarises the findings of assessments undertaken in relation to the risks of fatigue. These assessments were undertaken in the first half of 2017 and have been completed at six open cut coal mines in the Hunter Valley, NSW.

The targeted assessment is an in-depth look at the control measures for fatigue and their implementation. The assessments are undertaken by a multi-disciplined team of Mine Safety inspectors using both desktop and on-site assessment.

The findings of the assessments are grouped into those that are specific to the principal hazard of fatigue, and those that could be generally applied to all aspects of critical control measure implementation.

General findings highlight issues with the risk assessment process for fatigue, such as:

- workers at some mines not being provided with adequate information, training and instruction prior to participating in a risk assessment
- risk assessments not being undertaken by a person who is familiar with the nature of the hazard in relation to the particular mine site.

The specific findings identified that:

- supervisors were working excessive hours in breach of the fatigue management plan
- information, training and instructions on fatigue controls had not been reviewed and provided to supervisors
- control measures had been identified but not implemented consistently across all areas of the mine site for all workers
- crib breaks were identified as a control but there were no systems in place to monitor and verify that crib breaks were being taken by workers.

Targeted assessments are seen as a valuable process and a powerful analytical tool capable of identifying critical risk control issues not previously uncovered by conventional inspection regimes. This approach also highlights the benefits of using a multi-disciplined inspection team to identify issues across a range of areas through one activity.

The report also includes findings and recommendations arising from recent compliance and enforcement actions taken in relation to fatigue.

Background

Targeted assessment program

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

- a focus on managing prescribed 'principal hazards' from the WHS (M&PS) 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 of operations deemed 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 then 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 a thorough assessment of the control measures associated with the relevant hazard and their implementation.

Scope

Involving a multidisciplinary team of inspectors, the scope of the targeted assessment included two elements:

- a desktop assessment of:
  - compliance against legislation with respect to managing risks to health and safety associated with worker fatigue
  - controls the mine uses to prevent and mitigate worker exposure to health and safety risks due to fatigue related impairment
  - means the mine utilises to monitor the effectiveness of those controls
- a workplace assessment of the implementation of those controls.

The process

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

1. Preliminary team meetings and the preparation of documents.
2. Information and assessment requirements are discussed and supplied to the relevant mine.
3. Execution of a two-day on-site assessment involving:
   - a site desktop assessment of all relevant plans and processes
   - a discussion with the mine management team on the legislative compliance of the relevant plans
   - the inspection of relevant site operations.
4. Discussion and feedback to the mine management team on the findings and actions that need to be taken by the operators in response.

Risks of fatigue at work

Fatigue has been identified by mine operators as a contributing factor to numerous incidents in the mining industry. Shift work and the nature of the mining industry require workers to have irregular and often long hours in a high-risk working environment.

Fatigue can be defined as a state of impairment that can include physical and/or mental elements, including reduced alertness and performance. It is typically associated with inadequate sleep, extended time awake or the time of day.

Obligations

Under the *Work Health and Safety Act 2011*, person conducting a business or undertaking (PCBU) has the primary duty of care to ensure, in so far as is reasonably practicable, workers are not exposed to health and safety risks arising from the business or undertaking.[1] This duty includes eliminating the exposure to fatigue risks, for example, by appropriate rostering and maintaining a work environment that is designed to prevent fatigue. If it is not reasonably practicable to do so, then risks must be minimised, so far as is reasonably practicable, according to the hierarchy of controls.

The Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 requires a mine operator to manage risks and implement a range of control measures including:

- managing risks to health and safety associated with worker fatigue (clause 43)
- providing workers with suitable and adequate information, training and instruction about implementation of control measures in relation to fatigue (clause 104)
- consulting with workers about developing and implementing strategies to protect people from risks to health and safety arising from fatigue (clause 121)

Elimination and control

Mine operators should identify risk areas in relation to fatigue and select the most effective controls to eliminate or minimise those risks. More than one control measure may be required to reduce worker exposure to appropriate levels.

Control measures that will minimise the risks of fatigue include:

- ensuring work schedules enable sufficient sleep opportunities
- monitoring to identify the onset of fatigue and worker impairment
- implementing work arrangements such as breaks or job rotation.

Whatever strategy is adopted, it should be underpinned using the hierarchy of controls.

[1] Section 19 Work Health and Safety Act 2011

Targeted assessment for fatigue

Mine Safety's strategy is to ensure that workplaces with higher exposure to risks – for example, workplaces that schedule shifts of more than 12 hours or schedule consecutive night shifts – are implementing a range of measures to control the risks of fatigue.

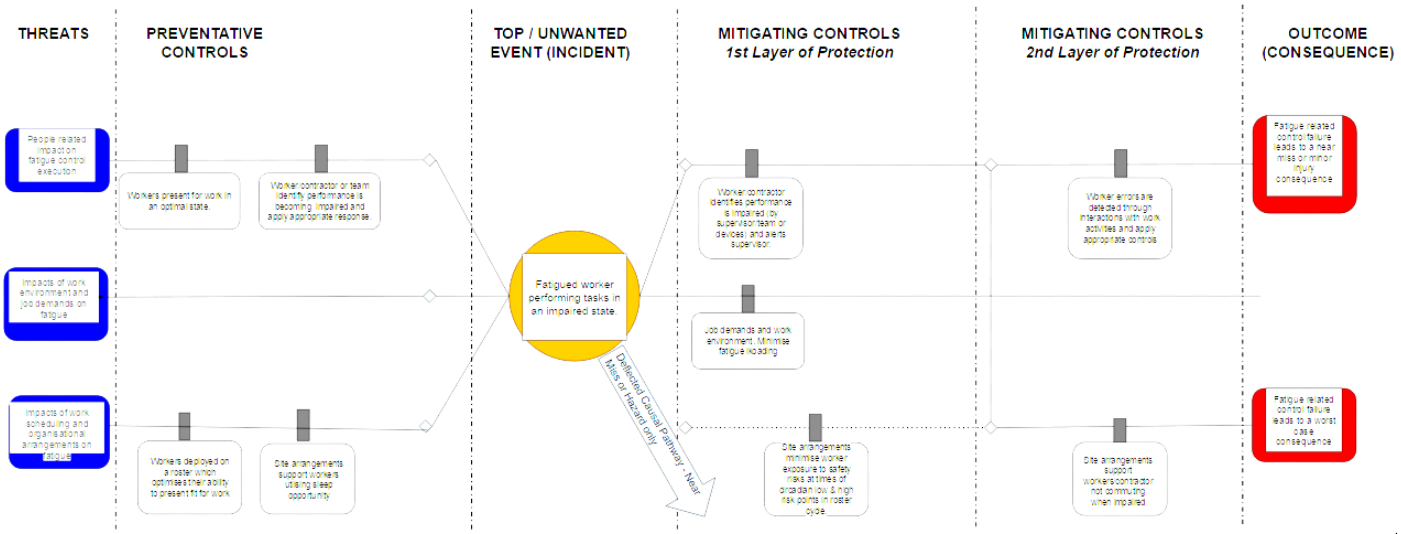
The management of fatigue at mines is a subject of targeted assessments that focuses on how worker exposure to fatigue is prevented.

Key categories assessed are:

- identification, assessment and risk controls for fatigue and associated risks
- preventative controls, that is, controlling the likelihood of fatigue developing
- mitigating controls, that is, controlling the effects of fatigue
- monitoring for worker exposure to fatigue
- verifying the effectiveness of controls.

Bow-tie risk assessment

When developing this targeted assessment program, Mine Safety completed a bow-tie risk assessment of the health and safety risks due to fatigue. The bow-tie risk assessment was facilitated by appropriately qualified external facilitators, and involved both Mine Safety inspectors, and external representatives with appropriate technical expertise.



Assessment findings

The assessment team concluded that at each of the sites subject to the assessment, mine operators were generally meeting their obligations with regard to the provisions of the regulations related to the management of risks associated with fatigue.

It was also evident that a number of the mine operators assessed had made a considerable investment in technology based solutions and infrastructure to assist in the management of risks associated with fatigue. However the effectiveness of these solutions varied across different sites.

The assessment team also concluded that the use of “fatigue huts”, providing workers with an appropriate location to rest, was a commendable initiative.

The targeted assessment revealed some issues with the identification and implementation of critical controls to manage risks associated with fatigue and more generally with the process of developing and reviewing controls. While these issues were not relevant at all of the sites assessed, the findings provide some valuable information which should be considered when developing critical controls.

The findings of this assessment are grouped into two categories:

- **General findings** that 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.

General findings

Risk assessments

Issue	Response
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.	It was observed that the mines’ risk assessments where fatigue risks were considered were typically related to the development of rosters. Mine sites did not have a specific risk assessment related to the management of risks associated with fatigue 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 (M&PS) Regulation)
Mine operators did not adequately consult with workers or give them a reasonable opportunity to express their views and contribute to the decision-making process in relation to the risk assessment process.	The mine operator is required to give workers a reasonable opportunity to express their views and contribute to the decision-making process. (Section 48 WHS Act)

The fatigue risks associated with the mine's roster arrangements had not been assessed against the control measures identified in the safety management system.	The mine operator should assess the fatigue risks associated with the roster arrangements against the control measures identified in the safety management system and ensure that all workers are considered i.e. staff, employee workers and contractors.

Information, instruction and training

Issue	Response
Mine operator had not provided training to workers prior to workers participating in the risk assessment for fatigue.	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 (M&PS) Regulation).
Supervisors had not been trained on fatigue management controls and the fatigue management plan.	Mine operators must provide fatigue management training and instruction to all workers, including supervisors in accordance with clause 104(2)(b) of the WHS (M&PS) Regulation. All mine operators relied on supervision as a control in fatigue management plans. 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.
Mine operators had not reviewed the information, training and instructions on managing fatigue for supervisors.	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 (M&PS) Regulation).
Workers did not always have an appropriate level of understanding of the operation of fatigue monitoring systems.	Worker's views on the effectiveness and intent of technology-based systems that monitor an individual's physiological parameters varied depending on the amount of training provided. At sites where workers were well-trained and had a sound understanding of how the monitoring system operated, workers had a higher level of "trust" in the system and responded to system alarms and warnings more effectively.

Specific findings

Fatigue management plan

Issue	Response
Mine operators had identified control measures in their plan but had failed to implement and/or review the control measures for fatigue consistently across the mine site.	The implementation and review of control measures must be consistently applied across all areas of the mine site including the preparation plants and workshop and maintenance areas.
Mine operators did not have systems in place to monitor contractors' compliance with the fatigue management plan.	Contractors were not always effectively monitored. Hours of work and roster patterns of itinerant contract workers were not considered in monitoring. Operators should have systems in place to monitor compliance with the fatigue management plan for all workers on site i.e. staff, employee workers and contractors.
Mine operators had identified crib breaks as a control in the fatigue management plan but did not have systems in place to ensure that workers were taking crib breaks.	The implementation and review of control measures must be consistently applied across all areas of the mine site including the preparation plants and workshop and maintenance areas

Shift length and minimum break between shifts

Issue	Response
Supervisors at some sites were routinely working shifts of 14 hours or longer in breach of the fatigue management plan. Shift supervisors were often not-considered in the same way as workers with regard to the management of fatigue.	Mine operators must minimise, as far as is reasonably practicable, the risks of fatigue impacting on the health and safety of supervisors.
The mine operator had identified a minimum break between shifts as a control measure but had failed to monitor this to ensure that this break was enforced by supervisors.	The fatigue management plan must clearly identify the implementation and review of controls and monitoring arrangements for fatigue.

Journey management plans

Issue	Response
The mine operator had not implemented journey management plans for workers in accordance with the fatigue management plan.	Where journey management plans are identified as a control measure for particular workers e.g. workers travelling more than 1 hour to and from the mine site, operators must ensure that plans are implemented and confirmed for those workers

Where to now

Targeted assessments provide an account of the issues observed at particular sites at a particular time. Some of the findings resulted in notices being issued, including notices of concern, under section 23 of the WHS (M&PS) Act, and improvement notices, under section 191 of the WHS Act.

The matters addressed by the notices reflect the findings of the Mine Safety inspectors. In summary, these findings are:

Notice	In relation to
Improvement notices, s 191	• Supervisors were working in excess of 14 hours, in breach of the fatigue management plan. • Workers were working in excess of the recommended number of shifts in breach of the fatigue management plan. • The operator had identified a minimum break between shifts as a control measure but had failed to monitor this to ensure that the minimum break between shifts was maintained. • Journey management plans were identified as a control measure for particular workers but were not implemented and confirmed for those workers. • 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 i.e. production, workshop and Coal Handling and Preparation Plants.
Notices of concern, s 23	• Control measures for fatigue were not implemented in accordance with the fatigue management plan. • Workers were not provided with information, training and instruction prior to participating in the risk assessment. • Supervisors had not been adequately trained in fatigue control measures.

All mine operators involved in this targeted assessment have indicated that they will respond to the notices and other issues identified through the inspections. Where significant issues were identified, these will be followed up with the individual mines.

The TAP process identified many common issues around the approach taken by mine sites to manage the risk of fatigue to the health and safety of workers. 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.

This program is scheduled to continue through 2017-2018 at open cut mines in NSW, and will also assess fatigue management practices in other sectors.

The regulator expects that all mines will review their procedures and practices in consideration of the findings of this summary.

Issued by

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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.

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Address	Resources Regulator, Mine Safety 516 High Street Maitland NSW 2320

Appendix A: Legislative requirements relating to fatigue management

The appendix provides a list of certain legislative requirements for the management of risks associated with worker fatigue referred to in this report as provided by the *Work Health and Safety (Mines and Petroleum Sites) Act 2013*, Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 and Work Health and Safety Regulation 2011.

Legislation, section/clause	Legislative requirements
WHS (M&PS) Regulation, clause 9	Management of risks to health and safety
WHS (M&PS) Regulation, clause 14	Content of safety management system
WHS (M&PS) Regulation, Clause 43	Fatigue
WHS (M&PS) Regulation Clause 104	Duty to provide information, training and instruction
WHS (M&PS) Regulation, clause 107	Review of information, training and instruction
WHS (M&PS) Regulation, clause 121	Mine operator must consult with workers
WHS Act, section 19(3)(c)	Primary duty of care
WHS Act, sections 47-49	Consultation with workers