NSW GOVERNMENT

NSW Resources Regulator

PLANNED INSPECTION PROGRAM – CONSOLIDATED REPORT

ROADS OR OTHER VEHICLE OPERATING AREAS – SMALL MINES AND QUARRIES

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Executive summary

A crucial part of the NSW Resources Regulator's Incident Prevention Strategy involves targeted assessment and planned inspection programs for mines and petroleum sites. This is a focus on assessing an operation's control of critical risks through evaluating the effectiveness of control measures in the mine's safety management system.

To this end the NSW Resources Regulator developed a bowtie hazard management framework and standardised assessment checklist for each program plan. Under each program plan, the effectiveness of the safety management system at each mine site is assessed against a standard set of control supports and critical controls.

This report summarises assessment findings from 86 mines or quarries in relation to the principal hazard of roads or other vehicle operating areas (ROVOA) for the period from September 2019 to December 2020. Further assessments are ongoing at the time of publication, however this report intends to detail the initial findings to date, which have predominantly covered Tier 2 quarries. The threats and critical controls assessed are shown in Table 1. Note that not all quarries were assessed for all critical controls.

Table 1. Threats and Critical Controls for the Material Unwanted Event (Surface vehicle interaction)

THREAT	CRITICAL CONTROL
■ Substandard vehicle operator areas ■ Environmental conditions ■ Component failure	PC1.1 – Road standards
■ Vehicles operating in close proximity	PC2.1 – Traffic management
■ Substandard vehicle operator areas ■ Vehicles operating in close proximity ■ Environmental conditions ■ Component failure ■ Human and organisational factors	PC2.3 – Competent vehicle operator

■ Substandard vehicle operator areas ■ Environmental conditions ■ Component failure	PC4.2 – Fit for purpose vehicles
■ Vehicles operating in close proximity ■ Human and organisational factors	PC5.2 – Fit for work operator

Legislative requirements and published guidance relating to the principal hazard of roads or other vehicle operating areas is listed in **Appendix A**. Figures 1 and 2 present safety compliance findings for the quarries assessed in relation to each critical control. Explanatory notes on the assessment system are also listed in **Appendix B**.

Key Findings

The below points outline the key findings which were uncovered during the planned inspection program:

- Several Principal Hazard Management Plans (PHMP) for ROVOA made no reference to the requirements of the WHS(MPS) legislation and as such lacked consideration of specific hazards and controls (*clause 28 - Movement of Mobile Plan & Schedule 1, Part 2, clause 4 – Roads or other vehicle operating areas*).
- Some sites did not have any type of ROVOA PHMP and relied on controls listed in other safety documents e.g. Safe Work Method Statements, Safe Work Procedures and induction safety rules.
- Underpinning risk assessments lacked site specific content and were often shared between locations without consideration for specific site conditions and hazards.
- Underpinning risk assessments regularly had no worker or subject matter expert involvement (eg. maintainers, pit designers and health professionals) and were merely an attempt to satisfy legislative requirements.
- The inclusion of '*road and other road related standards*' in the ROVOA PHMP was often poorly implemented and not well understood by workers.

- The inclusion of '*intersection*' design standards in ROVOA PHMP documents was often missed and was rarely evaluated in the underpinning risk assessment.
- The acknowledgement and use of accepted industry road standards was often overlooked.
- Many examples were identified where site ROVOA standards did not meet the requirements of the mine operator's documents.
- Opportunities for minimising and/or segregating vehicle interaction were not adequately assessed or implemented, particularly with respect to pedestrian segregation.

Recommendations

To address the continued occurrence of incidents involving vehicle interactions and roll-overs, mine operators should:

- Ensure that ROVOA PHMP documents are developed in consultation with the workforce, subject matter experts and are based on the findings of a documented risk assessment.
- Ensure that ROVOA PHMP documents are site specific and record the required road and other road related standards for the mine.
- Ensure that ROVOA PHMP acknowledges and references the requirements of known industry standards, (eg. Section 5, Guide Health and safety at quarries – Nov 2018).
- Eliminate unnecessary vehicle interactions on-site through segregation of traffic or permit restrictions, where reasonably practicable.
- Eliminate unnecessary vehicle/pedestrian interactions through the implementation of designated pedestrian corridors and controls when working in proximity of mobile plant.
- Reaffirm expectations with supervisors around visible leadership practices and the requirement to conduct meaningful interactions with workers based on the requirements of ROVOA PHMP.

Contents

Executive summary 2
Key Findings 3
Recommendations 4
Introduction 6
Scope 6
The process 6
Assessment findings 7
Controls assessed 7
Assessment findings - results by critical control 13
Assessment findings - ratings by critical control 14
Notices issued 15
Further information 17
Appendix A. Legislative requirements and published guidance relating to the principal hazard of roads or other vehicle operating areas 18
Appendix B. Assessment system explained 19
Assessment findings 19

Introduction

The NSW Resources Regulator's planned assessment programs provide a planned, risk-based and proactive approach to assessing how effective an operation is when it comes to controlling critical risk. These programs apply the following principles:

- a focus on managing prescribed 'principal hazards' from the Work Health and Safety (Mines & Petroleum Sites) Regulation 2014
- evaluation of the effectiveness of control measures implemented through an organisation's safety management system and
- consideration of the operation's risk profile.

The objective of risk profiling is to identify the inherent hazards and the hazard burden 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.

Scope

Planned inspection programs include two assessment types:

-
- Planned assessments, which involve a workplace assessment of the implementation of controls through the inspection of plant and worker interviews only.

The process

The process for undertaking planned inspections 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 quarry management team on the findings and actions that need to be taken by the mine operators in response.

Assessment findings

Controls assessed

Threats:

- Substandard vehicle operator areas
- Environmental conditions
- Component failure

Critical control: PC1.1 Road standards

There are numerous mechanisms which can contribute to the quality of road standards and if not managed appropriately can potentially result in serious or fatal injuries to workers who operate equipment within those areas. For this reason, it is critical that quarries ensure such areas are suitable for use and are regularly maintained and monitored. In relation to road standards, the criteria below were assessed for each site:

- A risk assessment identified risks associated with roads or other vehicle operating areas
- Procedures described the controls relating to road standards
- Suitable roads were available for vehicles
- Roads were inspected and maintained
- Information, training and instruction material on road standards was produced and delivered.

With regards to this critical control, the below points highlight some of the findings:

- Of all the controls assessed during the planned inspection, the failure to develop, record and implement agreed road standards was the most frequent non-compliance.
- There were many occasions when road standards did not exist.
- Often road standards were developed without reference to known industry standards.
- Road standards were frequently developed without using any type of risk management process.

- Documentation relating to ROVOA controls (risk assessment, PHMP, SWMS etc.) were often not relevant, current or readily available.
- Despite the shortcomings listed above, there were many examples where the standard of roads and traffic management on site was of a high quality, however the mine operator had not adequately documented what these controls were.

Threat:

- Vehicles operating in close proximity

Critical control: PC2.1 Traffic management

Traffic management is a critical control which is intended to prevent the opportunity for vehicles or mobile plant to interact with infrastructure, pedestrians, or other vehicles and mobile plant. It is expected that quarries have implemented effective traffic management controls to ensure that such interactions are eliminated or in any case minimised so far as is reasonably practicable. This inspection program assessed each site's traffic management controls with regards to the following criteria:

- A risk assessment identified the risk of vehicles operating in close proximity to pedestrians, other vehicles and infrastructure.
- Procedures described the identified traffic management controls.
- Trigger Action Response Plans (TARPs) guided the execution of the traffic management controls.
- Documents, tools and equipment required to manage traffic were made available.
- Traffic management information, training and instruction material was produced and delivered.
- Workers were compliant with traffic management requirements.
- Vehicle interaction near misses and events were reported, investigated and actioned in a timely manner.

With regards to this critical control, the below points highlight some of the findings:

- Most mine operators relied heavily on the use of positive communications through two-way communication devices, speed restrictions and signage to manage traffic hazards.

- A traffic management plan was generally available, although not always up-to-date and accurate.
- The use of call and hold points was extensive and generally well understood.
- Vehicle parking standards were often adhoc and did not include designated Heavy Mobile Equipment (HME) 'Go lines', light vehicle (LV) parking areas and did not promote reverse parking as a standard.
- Risk assessments often failed to adequately assess all activities and all interaction points, particularly when considering vehicle/pedestrian interactions.
- Most mine operators had traffic management controls recorded in various safety documents (SWMS, SOPs, induction rules etc.), where they did not have a PHMP for ROVOA.
- The management of pedestrian and vehicle interactions varied widely across sites. Several mine operators had a mature system and had conducted thorough risk assessments with a cross section of the workforce and had committed considerable resources to ensure pedestrians and vehicles were separated. However, there had been little to no consideration of the hazard by some other mine operators.
- Interactions between mobile plant and infrastructure were often not considered in ROVOA risk assessments.

Threats:

- Substandard vehicle operator areas
- Vehicles operating in close proximity
- Environmental conditions
- Component failure
- Human and organisational factors

Critical Control: PC2.3 Competent vehicle operator

In addition to implementing effective road standards and traffic management controls, it is imperative that vehicles are safely operated by workers who have the necessary knowledge and skills to carry out the task. Quarries should have comprehensive and robust systems in place to ensure workers are not

only trained and competent, but also authorised to operate vehicles within various areas of the operation. Sites were assessed on the following criteria:

- A risk assessment identified the risk of vehicles operating in close proximity to pedestrians, other vehicles and infrastructure.
- Procedures described the identified competent vehicle operator controls.
- A system for managing competency of vehicle operators was established.
- Vehicle operating procedures were available.
- Vehicle operator competencies were available.
- Vehicle operators were assessed as competent.
- Vehicles were safely operated.
- Hazards were identified and controlled.
- Information, training and instruction were delivered to vehicle operators.

With regards to this critical control, the below points highlight some of the findings:

- Most mine operators had a system to verify the competency of mobile plant operators.
- The quality of the verification process varied greatly, with some operators still relying on visual observations with no assessment criteria and no record of the assessment process or how they recorded the result.
- Procedures for the operation of mobile plant were generally available and when interviewed workers had a good understanding of the procedural requirements and controls.
- Several sites were identified where contractors operated mobile plant and the mine operator did not have a process to verify the competency of the contract worker.
- Most mine operators held pre-shift meetings in the form of toolbox talks, where they distributed information and facilitated change management. There were several sites that do not record the content of the meetings.

Threats:

- Substandard vehicle operator areas
- Environmental conditions
- Component failure.

Critical Control: PC4.2 Fit for purpose vehicles

Vehicles are able to safely carry out the functions they were designed to perform for the intended use, over the lifetime of the vehicles. Sites were assessed on the following criteria:

- A risk assessment identifies the risk of vehicle component failure.
- Procedures describe the identified vehicle component failure controls.
- Vehicles new to site are checked to make sure they are fit for the purpose they will be used for.
- Vehicles are used for tasks that are appropriate for the vehicle design.
- Features of a vehicle critical to its safe use are identified.
- Inspection, maintenance and testing identifies safety critical components that do not meet the established criteria.
- Risk management processes are applied to manage changes to vehicle configuration, using vehicles for purposes other than they were originally designed and for using vehicles beyond limits specified by the manufacturer.

With regards to this critical control, the below points highlight some of the findings:

- Many sites did not have a risk-based approach to assessing the hazards associated with the operation of a piece of mobile plant and its initial assessment when it came to site.
- The standard and use of pre-start checks on mobile plant varied greatly. Better sites had a good grasp of ‘safety critical items’ to be inspected and generally had well defined checklist systems (some electronic) that triaged hazards to control defect reporting.
- Weaker performing sites may have had a documented pre-start system, however upon further investigation it was often identified that it was not being used. During inspections at these sites, inspectors tended to identified vehicles that were not ‘fit for purpose’ and appropriate regulatory action was taken.

- The planned inspection program was not able to ascertain an overall picture of the performance and knowledge of maintenance personnel due to most sites not having a 'maintainer' on site at the time of assessment. The use of contract maintainers is extensive throughout the sector.

Threats:

- Vehicles operating in close proximity
- Human and organisational factors

Critical Control: PC5.2 Fit for work operator

Vehicle operators attend work physically and mentally capable of performing their duties and free from the influence of fatigue, alcohol and other drugs. Sites were assessed on the following criteria:

- A risk assessment identifies the risk of vehicles operating in close proximity to pedestrians, other vehicles and infrastructure.
- Procedures describe the identified operator fitness for work controls.
- Vehicle operators are physically capable of performing vehicle operating tasks.
- Vehicle operators are free from impairment caused by alcohol and other drugs.
- Vehicle operators are aware of mental wellness issues and have access to support when suffering a mental wellness issue.
- Vehicle operators are aware of fitness for work risks and the controls the site is using.
- Workers suffering from fitness for work related issues have access to support.

With regards to this critical control, the below points highlight some of the findings:

- Controls used to manage worker fitness varied considerably between sites.
- More mature mine operators had documented systems to manage fatigue, drug and alcohol use, and worker wellness. Interviews with workers confirmed their understanding of these systems and their implementation.
- Poorer performing sites generally had little to no 'human resource' support and at best had rudimentary policies, which outlined the consequences of a breach, rather than any type of support and guidance material.

- Most mine operators openly supported the concept of self-reporting for fatigue and would support the worker where practicable.
- Mental wellness programs were available at larger sites, but not small operations.
- There were no themes identified regarding fatigue due to reduced shift lengths and short commuting distances.

Assessment findings - results by critical control

The figure below presents industry aggregate results for the assessment findings by each critical control. It provides a view of the overall status of hazard management systems (at the critical control level) across the 86 quarries assessed. It is worth noting that in calculating the aggregate results the value of fully implemented and documented controls has been recognised. More details explaining the assessment system are found at Appendix B. Of note, not all quarries were assessed against all critical controls due to varying circumstances.

Figure 1: Overall assessment findings results for the planned inspection program for roads or other vehicle operating areas – small mines

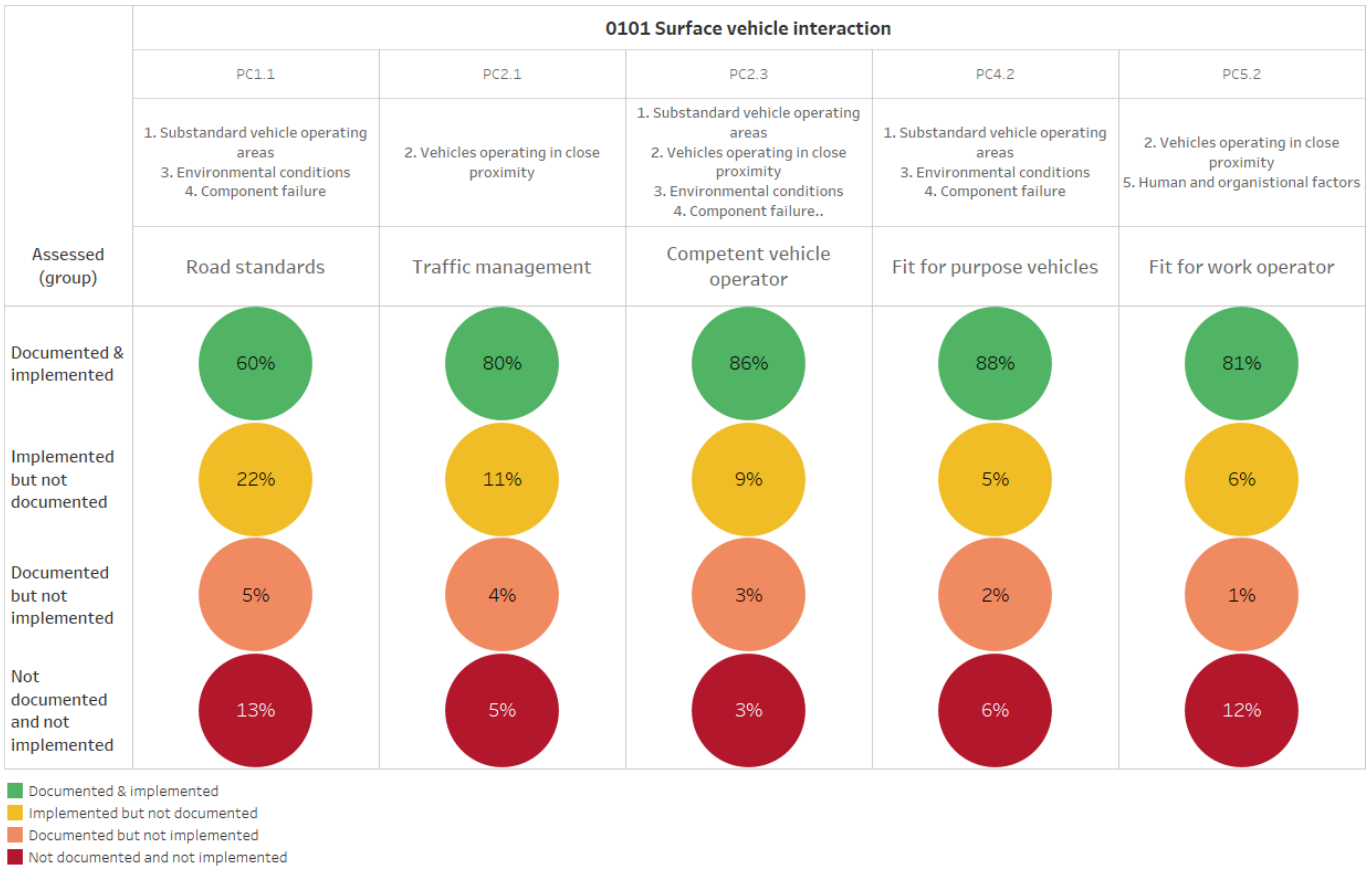
0101 Surface vehicle interaction				
PC1.1	PC2.1	PC2.3	PC4.2	PC5.2
1. Substandard vehicle operating areas 3. Environmental conditions 4. Component failure	2. Vehicles operating in close proximity	1. Substandard vehicle operating areas 2. Vehicles operating in close proximity 3. Environmental conditions 4. Component failure 5. Human and organistional factors	1. Substandard vehicle operating areas 3. Environmental conditions 4. Component failure	2. Vehicles operating in close proximity 5. Human and organistional factors
Road standards	Traffic management	Competent vehicle operator	Fit for purpose vehicles	Fit for work operator
72%	86%	91%	91%	84%

Yellow (>= 80% and <100%)
Orange (>= 65% and <80%)

Assessment findings - ratings by critical control

The figure below presents aggregate assessment ratings by critical control. This provides a summary view of the overall findings of each critical control. Of note, not all control supports were assessed at each quarry and as a result they have been identified as not applicable/not assessed. More details explaining the assessment system are found at Appendix B.

Figure 2: Overall assessment findings ratings for the planned inspection program for roads or other vehicle operating areas – small mines



Notices issued

Of the 86 sites assessed under the inspection program, 77 separate quarries received notices relating to the principal hazard of roads or other vehicle operating areas, while some quarries received notices in relation to other matters. For the purposes of this report, contraventions related to other matters have been removed from the analysis. The notices issued for roads or other vehicle operating areas were examined in detail and Table 2 below lists the notices issued by type and details.

Table 2: Notices issued for the planned inspection program for roads or other vehicle operating areas

NOTICE TYPE	TOTAL ISSUED	NUMBER OF MINES
s.23 notice of concerns	46	46
s.191 improvement notice	75	49
s.195 prohibition notice	4	2
Total	125	77

Of the combined 125 notices issued, there were some common themes which were apparent throughout the program plan. Table 3 summarises the type of contraventions and also outlines the total occurrences encountered. These themes can be related back to the critical controls outlined earlier and identify some trends which are of concern.

Table 3: Notices issued - prevalence of categories of concern

IDENTIFIED CONCERN CATEGORY	TOTAL OCCURRENCES IN NOTICES
Documentation relating to road and other road related standards (drainage, intersection, bunding, signage, etc) is non-existent or poor	37
Poor standard of verifying compliance to nominated controls on site	27
Vehicles not fit for purpose	14
Documentation relating to controls for roads or other vehicle operating areas (Risk Assessment, PHMP, TARPs etc.) not relevant, current, or readily available	13
Opportunities for minimising and/or segregating vehicle interaction not adequately assessed or implemented	6
Pre-use inspection checklists did not accurately specify safety-critical components of the vehicle	5
Workers and supervisors not familiar with principal management plan	4
Lack of controls to restrict unnecessary or unauthorised vehicles and persons from entering active production or work areas	4
Active roads and intersections were not constructed to site standard or design guidelines	4
Lack of a risk assessment conducted in relation to the principal mining hazard	4
Workers observed to be non-compliant with the nominated controls on site	2
Workers not familiar with nominated controls on site	2
No formal requirement for supervisors to be trained in the relevant controls nominated for site	1
Poor standard of signage and delineation along active roads	1

Further information

For more information on planned inspection programs, the findings outlined in this report, or other mine safety information, please contact the NSW Resources Regulator:

CONTACT TYPE	CONTACT DETAILS
Email	cau@planning.nsw.gov.au
Incident reporting	To report an incident or injury call 1300 814 609 or log in to the Regulator Portal
Website	www.resourcesregulator.nsw.gov.au
Address	NSW Resources Regulator 516 High Street Maitland NSW 2320

Appendix A. Legislative requirements and published guidance relating to the principal hazard of roads or other vehicle operating areas

The following is a list of certain legislative requirements for the management of unsafe operation of manned vehicle/mobile plant 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.

- Work Health and Safety (Mines and Petroleum Sites) Regulation 2014
  - Clause 28 - Movement of mobile plant
  - Clause 103 - Duty to inform workers about safety management system
  - Clause 104 - Duty to provide information, training and instruction
  - Clause 107 - Review of information, training and instruction
  - Clause 108 - Record of training
  - Schedule 1, Part 2, Clause 4 - Roads or other vehicle operating areas
- MDG 15 - Guideline for mobile and transportable plant for use at mines (other than underground coal mines)
- MDG 2007 - Selection of collision management systems
- Safety Alert (SA20-09) - Operating mobile plant - Incidents and near misses
- Safety Bulletin (SB19-09) - Lack of bunding on accessible edges
- Safety Bulletin (SB18-11) - Windrow management and demarcation
- Safety Bulletin (SB18-06) - Lack of positive communications
- Safety Bulletin (SB17-01) - Industry reports more truck rollover incidents

Appendix B. Assessment system explained

The NSW Resources Regulator uses a bowtie framework to proactively assess how mine sites manage their principal hazards. Bowties are a widely used risk management tool that integrates preventative and mitigating controls onto threat lines that relate to a material unwanted event.

As part of program planning, controls were categorised by the NSW Resources Regulator's Mine Safety Inspectorate in accordance with the ICMM handbook. Only controls deemed critical[1] are assessed under a planned inspection program. For a control to be assessed as effective, each of its control supports must be in place and operational.

Assessment findings

During each mine's on-site assessment, inspectors rate each control support and record the findings. Points are awarded depending on whether there was evidence that the control support had been documented and / or implemented.

For the finding outcomes in this report, points were awarded for each control support identified within a critical control. An effective control support is allocated four points where the control was assessed as fully implemented and documented. An overall assessment result for the critical control is then calculated as a proportion of the maximum possible points for that critical control. For example, if a critical control comprises ten control supports and five were assessed as fully implemented ('documented and implemented') and five were found to be 'not documented and not implemented' then the overall assessment result for that critical control would be 50%.

Finding outcome and points

FINDING OUTCOME	POINTS
Documented and implemented	4
Implemented but not documented	2
Documented but not implemented	1
Not documented and not implemented	0

Critical control calculations also take into account instances where control supports were not applicable to the mine being assessed or when control supports were not able to be assessed during a site visit.

[1] Critical Control Management Implementation Guide, International Council on Mining and Metals (ICMM), 2015.

The overall assessment result for each critical control has been assigned a colour based on the assessment bands presented in the table below. The colour band results are then used to identify industry focus areas requiring improvement.

Assessment results colour code

CRITERIA	COLOUR
An assessment result of 100% of possible points	Green
An assessment result of ≥ 80% but < 100% of possible points	Yellow
An assessment result of ≥ 65% but < 80% of possible points	Orange
An assessment result of < 65% of possible points	Red