Resources Regulator
Department of Regional NSW

NSW GOVERNMENT

Welcome to MISHEF 2023

August 2023

regional.nsw.gov.au

The Department of Regional New South Wales acknowledges that it stands on Country which always was and always will be Aboriginal land. We acknowledge the Traditional Custodians of the land and waters, and we show our respect for Elders past, present and emerging. We are committed to providing places in which Aboriginal people are included socially, culturally and economically through thoughtful and collaborative approaches to our work.

NSW GOVERNMENT

Session 1

08:45am – 09:00am	Registration
	Session 1 – Chairperson: Xavier Hill Welcome to MISHEF 2023
	NSW Resources Regulator update – Anthony Margetts, NSW Resources Regulator Competency Board Update – Joanne Muller
	Central Assessment Unit – Ben Withers, NSW Resources Regulator
	Mechanical update – Greg Connolly, NSW Resources Regulator
	Electrical update – Russell Wood, NSW Resources Regulator
	METEX Group Programme Update – Russell Wood, NSW Resources Regulator
10:20am – 10:50am	**Morning tea**

Resources Regulator
Department of Regional NSW

NSW GOVERNMENT

NSW Resources Regulator update

Anthony Margetts

NSW Resources Regulator

NSW Resources Regulator Update

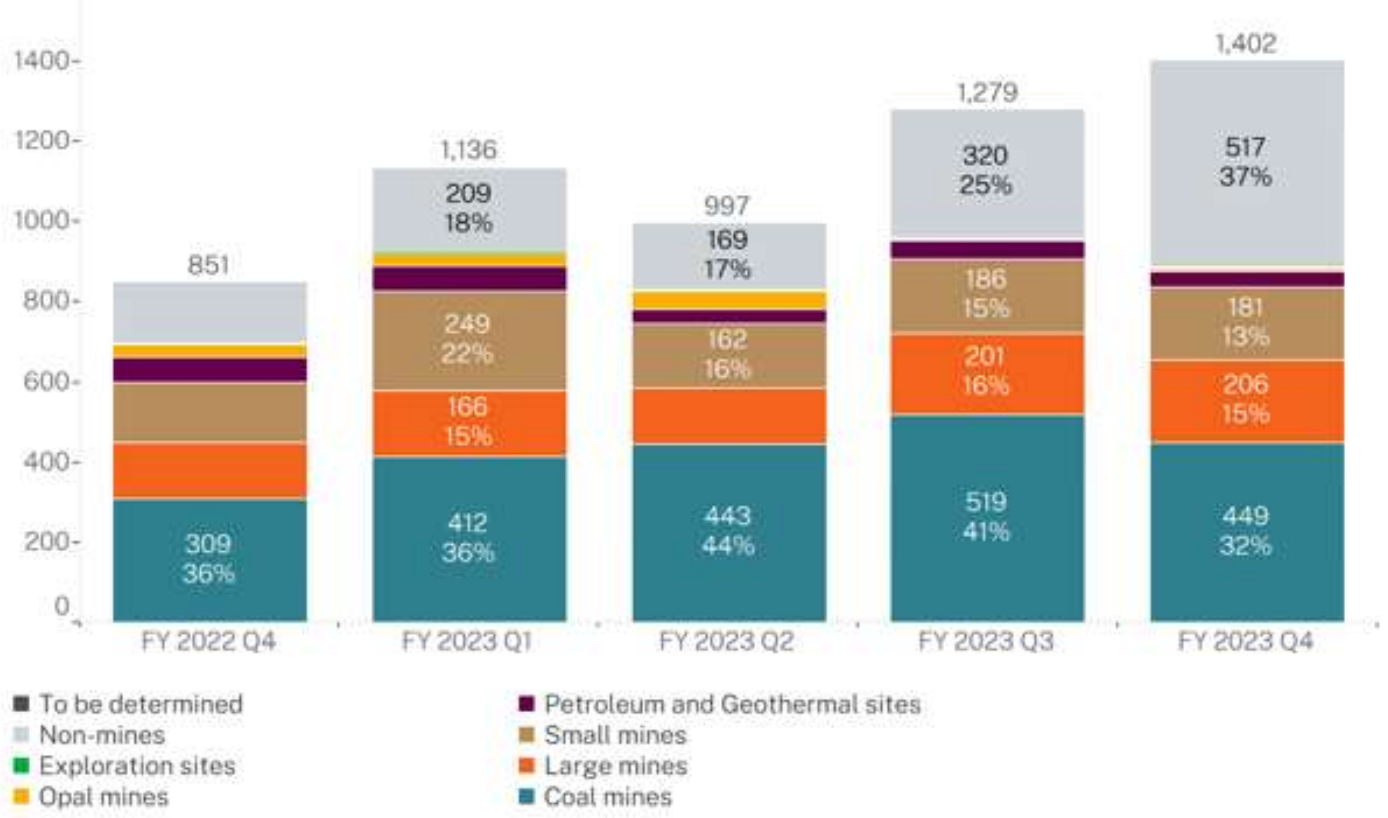
1. Regulator Review – previous 12 months

2. 2023 July to December Compliance Priorities

3. Vehicle Interaction Discussion Paper

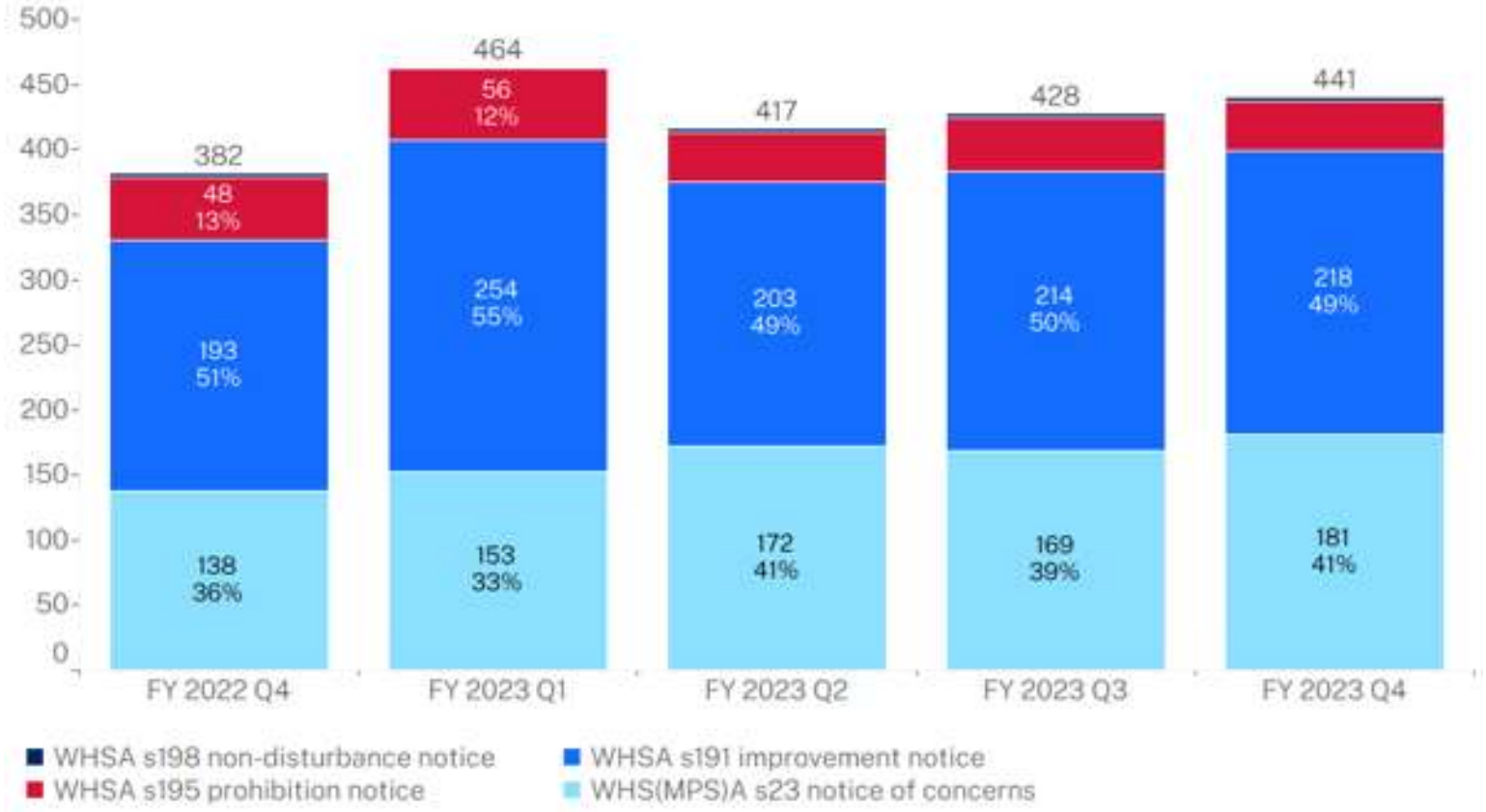
Regulator Review

Mine Safety Assessments by Quarter – All Sectors



Regulator Review

Mine Safety Notices by Quarter – All Sectors



Regulator Review

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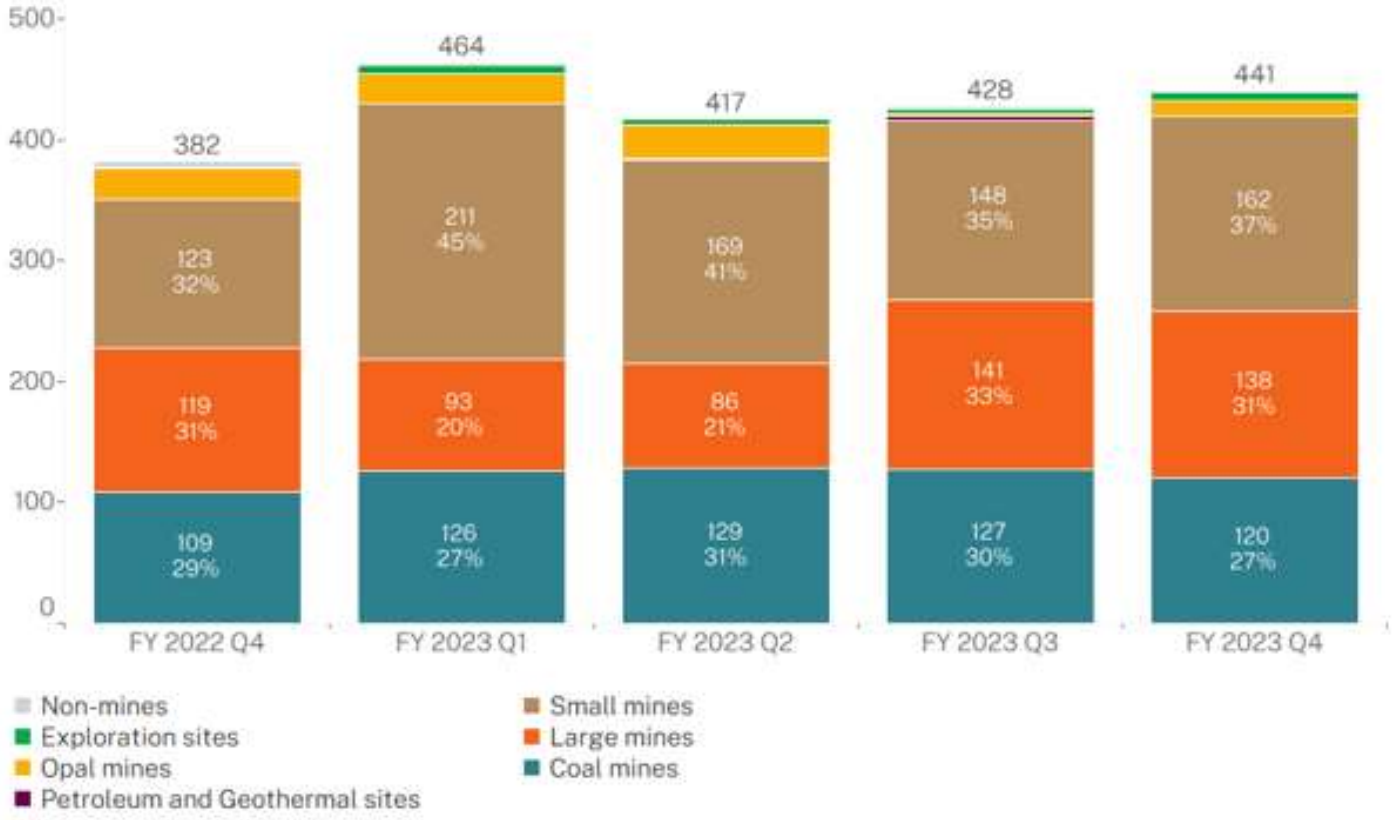
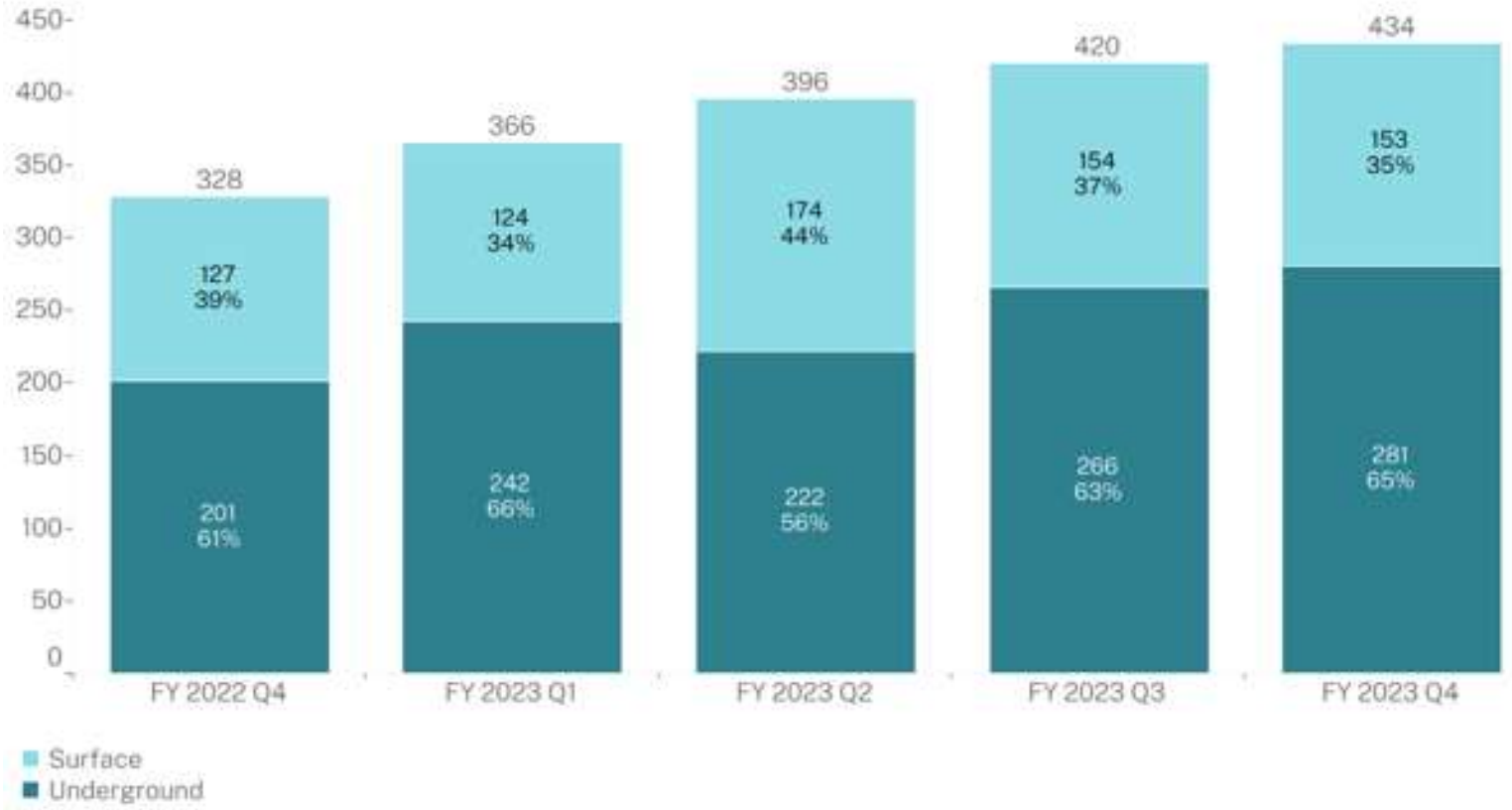


Regulator Review

Mine Safety Incidents Reported **COAL ONLY**



Regulator Review

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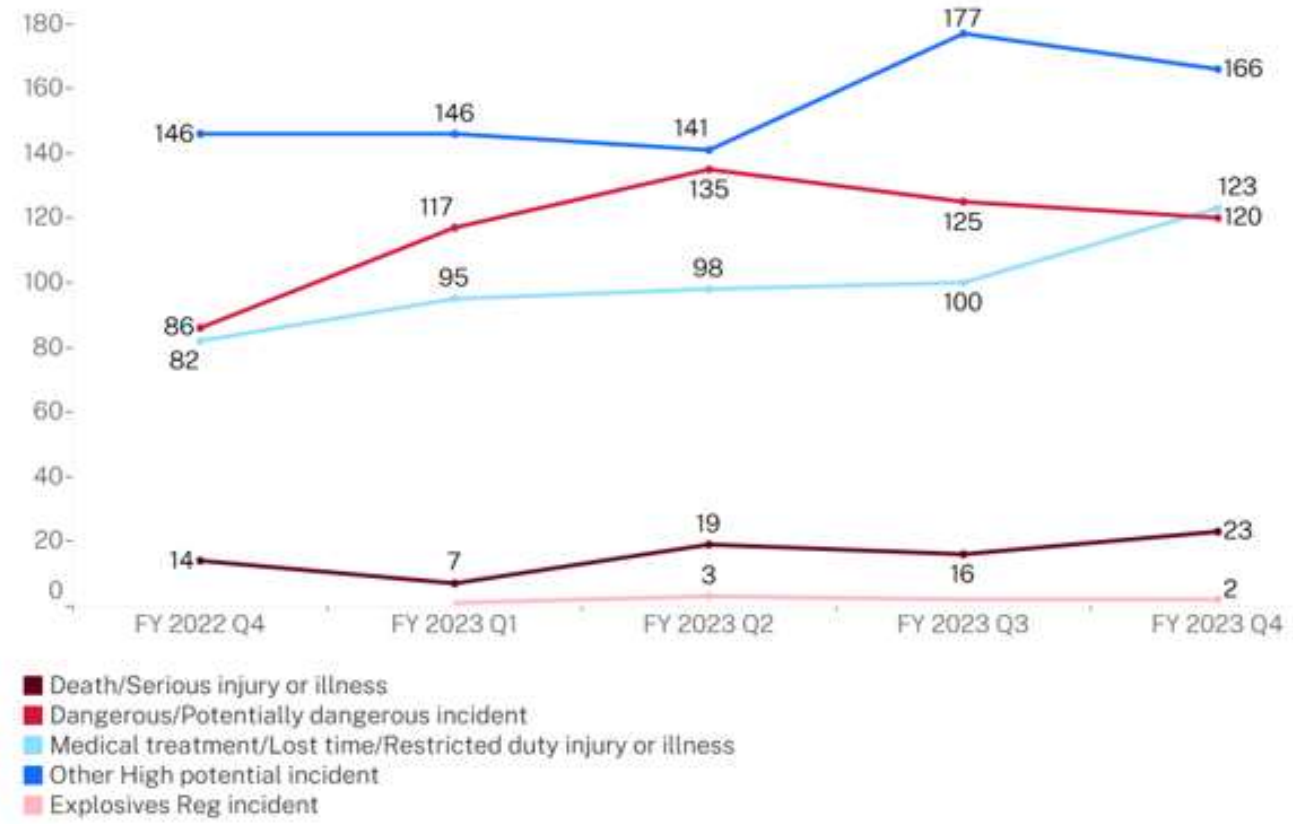
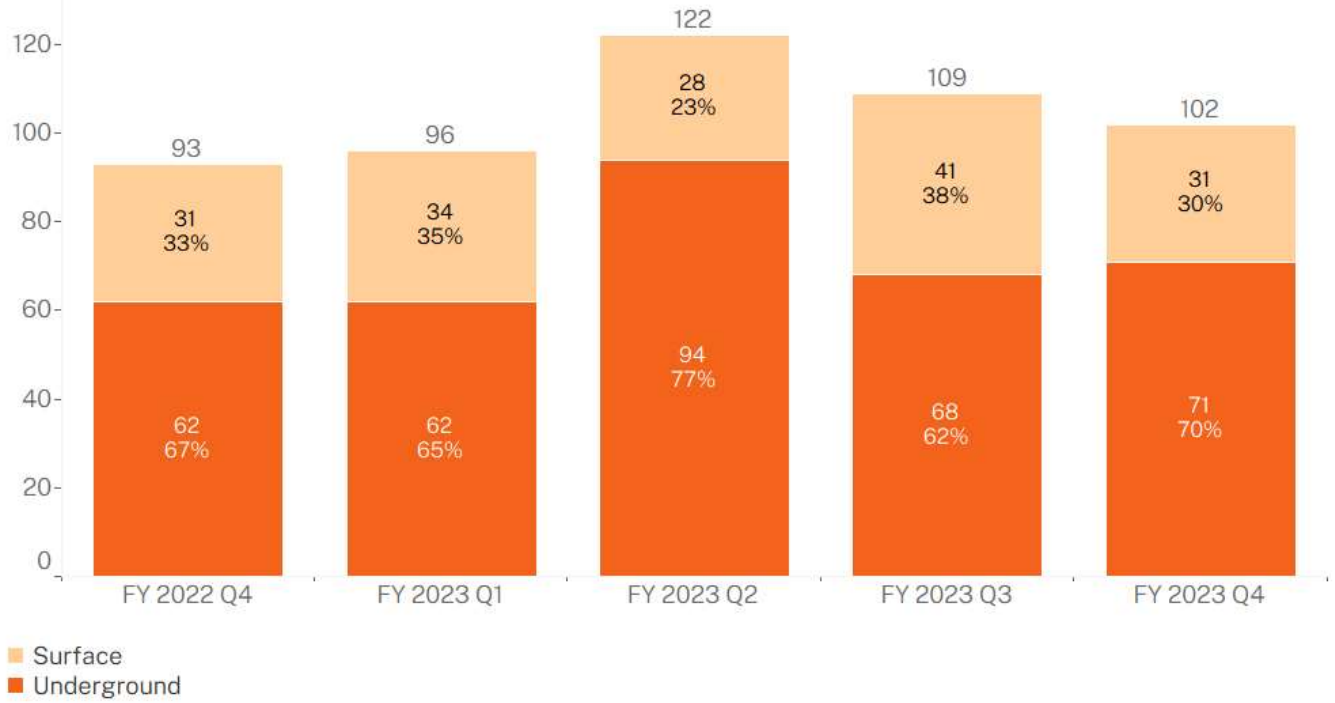


Regulator Review

Mine Safety Incidents Reported **Metex and Large Quarries**



Regulator Review

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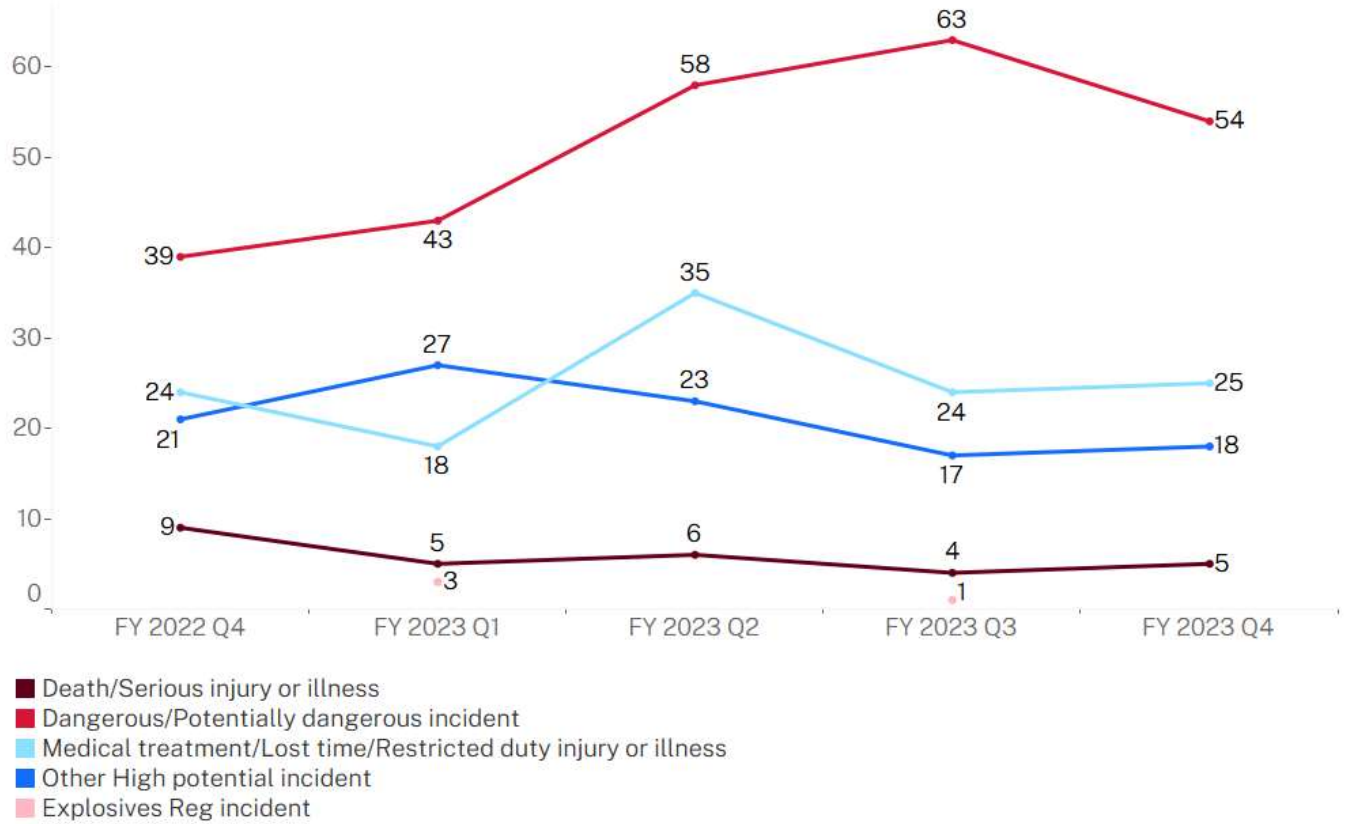
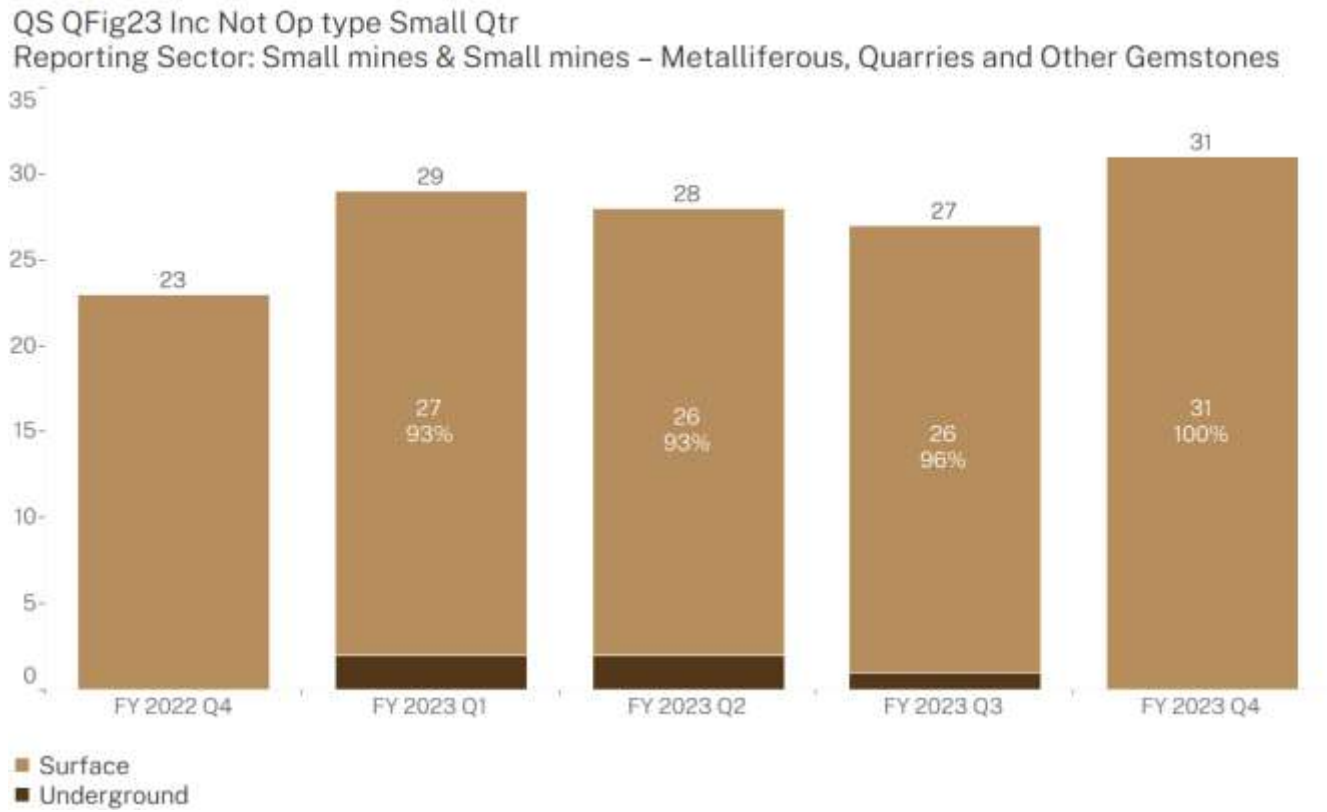


Regulator Review

Mine Safety Incidents Reported **Quarries and Gemstones**



Regulator Review

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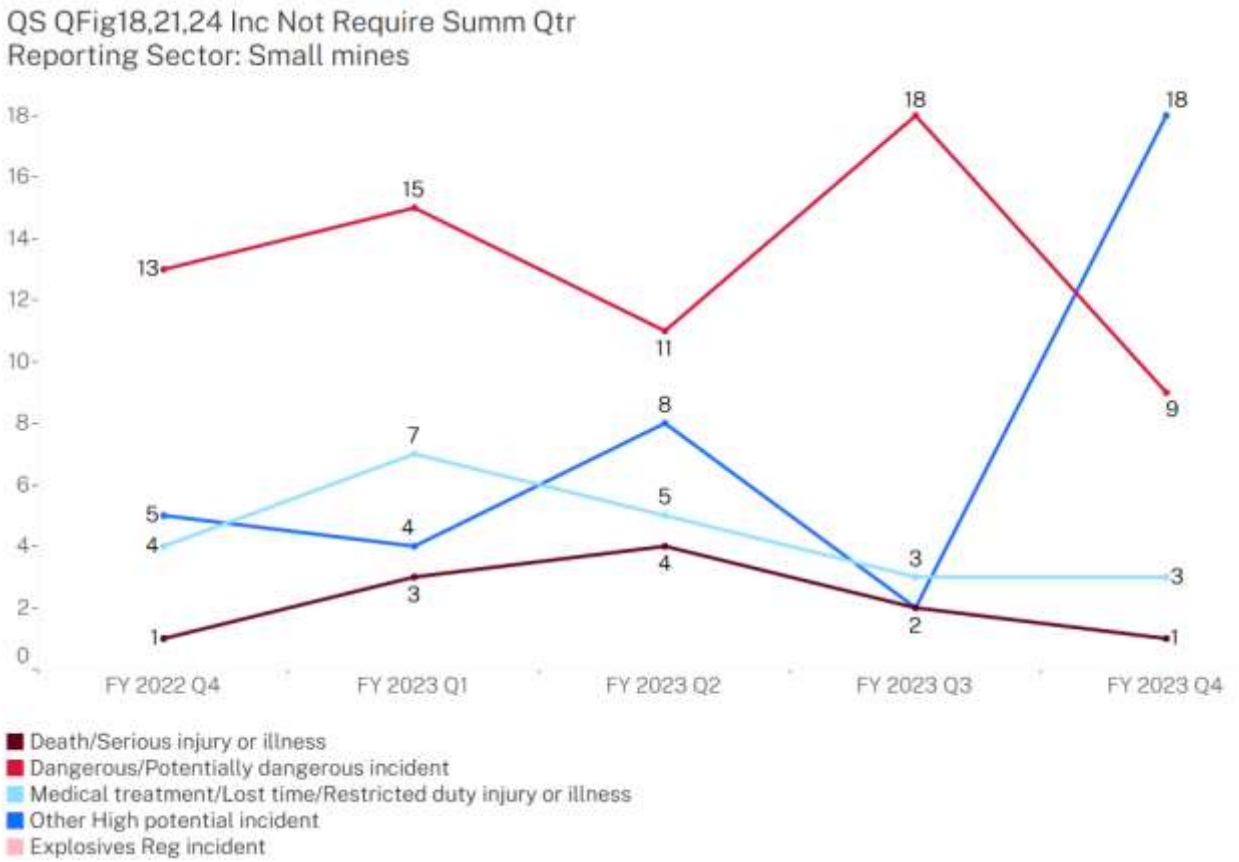

So, what does this all mean?

- There's still a lot work to be done across all sectors to reduce dangerous and high-potential incidents from occurring
- We're still very active in our proactive assessments throughout NSW mines. Approximately 10% of these will be 'unannounced' going forward
- We will continue our collaborative approach with the mining industry and key stakeholders in NSW to improve compliance with legislative and WHS outcomes for workers
- Key concerns such as vehicle interaction incidents will remain a priority for the NSW RR in the immediate future

Compliance Priorities and Projects – July to Dec 2023

- Our compliance priorities are set for 6 months each year
- It's a combination of compliance checks, awareness campaigns, special projects and other key compliance work that will be undertaken
- The document is published on our website the month before the period begins

Compliance Priorities and Projects – July to Dec 2023

Our Compliance Priorities

Heavy vehicle interaction

Sector: Open cut coal and metalliferous mines

As a part of a Targeted Assessment Campaign, inspectors will be attending mines training days and pre-shift briefings to present to workers recent incidents and highlight the importance of the role they play in helping reduce the number of collision and near misses. This is part of an effort to decrease the number of collisions and near misses involving heavy mining equipment.

Ventilation management

Sector: Underground metalliferous mines

As a part of planned inspection activities, inspectors will be following up with mine operators to assess the quality of ventilation in underground mining operations. During routine assessments and responding to reportable incidents inspectors have seen an increase in the number of areas not being ventilated effectively and not compliant to the mine operators documented ventilation control plans and engineering standards.

Compliance Priorities and Projects – July to Dec 2023

Our Compliance Priorities

Implementation of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2022

Sector: Small mines

As a part of planned inspection activities, inspectors will be following up with mine operators to assess progress on complying with new or amended sections of the regulation. Whilst the key objective of this program is to ensure that mine operators are taking appropriate action to achieve compliance with the regulations, it will also provide an opportunity for mine operators to give feedback to the Resources Regulator on perceived impediments to compliance, and whether further advice and guidance is required.

Compliance Priorities and Projects – July to Dec 2023

Our Strategic Projects

Airborne / Diesel Contaminants

As a part of an ongoing focus, we will be conducting an awareness campaign to ensure the mining industry understands its obligation and our expectations of reducing the potential risk of airborne and diesel contaminants to workers. This will have both educational and regulatory components along with workshops and seminars.

Coal Supervision

We will be running workshops and webinars to further educate supervisors in their roles and responsibilities within the industry.

Metalliferous Statutory Roles

We will be running a series of webinars to engage with metalliferous statutory role holders to ensure understanding and alignment of statutory accountabilities within the metalliferous industry.

Compliance Priorities and Projects – July to Dec 2023

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Vehicle Interaction Controls – Discussion Paper

- The NSW Resources Regulator will publish the ***Vehicle interaction controls in NSW mines discussion paper*** on 27th July 2023, closing 8th September

- Feedback can be given through the : NSW Government - Have your say portal or in writing

- Keep an eye our for it's release in our Mine Safety News or Weekly Incident Summary e-mails

Vehicle Interaction Controls – Discussion Paper

- Through the consultation and engagement process, the Regulators focus has evolved from just being about the technology, to a broader more holistic approach
- Approach now includes critical work leading up to the implementation of technology and recognition that technology is no ‘silver bullet’
- Key industry bodies such as EMESRT and ICMM are actively working in this space and developing some good guidance
- The discussion paper reflects this evolution

Vehicle Interaction Controls – Discussion Paper

The paper introduces possible pathways & positions

- Pathways are about the 'how'
- **How** should the Regulator achieve improved compliance vehicle interaction outcomes in the NSW Mining Industry?

Pathway 1

Continue engaging with industry, suppliers, and relevant parties through forums and workshops to promote the advancement of VI controls, including proximity detection and collision avoidance controls.

Pathway 2

Legislate the implementation of proximity detection and collision avoidance technologies.

Pathway 3

Alter the Roads and Other Vehicle Operating Areas requirements in legislation to include a requirement for consideration of the EMERST levels 1 through 9.

Pathway 4

Release a Position Paper detailing what the Regulator considers is reasonably practicable and conduct assessments and programs on the basis of this position.

Pathway 5

Develop a Technical Reference Guide (TRG) for the requirements VI controls at Mine Sites as a guide to industry.

Vehicle Interaction Controls – Discussion Paper

The paper introduces possible pathways & positions

- Positions are broader and establish a foundation for further action

Position 1

It is reasonably practicable that mines assess the implementation of Proximity Detection and Collision Avoidance systems, conducting re-assessments as technology advances

Position 2

Mines should adopt the EMERST/ICMM model and methodology when developing, implementing, and maintaining vehicle interaction controls. It is reasonably practicable to integrate these models.

Position 3

The Regulator augment its current assessment structure for Roads and Other Vehicle Operating Areas and include the EMERST Level 1 through 9 Criteria as the basis for assessment. The Regulator would assess against the EMERST systems guidelines and monitor implementation of systems based on these criteria.

Being a discussion paper, there is scope to provide feedback outside the suggested pathways and positions. They are provided as a guide for the type of feedback we would like, please feel free to suggest alternatives

RCS and DPM Position

- Current RCS WES of 0.05mg/m3 is referred to in the WHS (MPS) Regs
  - NSW RR currently has no plans to alter this stance
  - Monitoring for any announcements from SafeWork Australia

- SafeWork Australia's proposal introduce a DPM WES 0.015mg/m3
  - Submitted our feedback in May 2023 raising the issue of measurability primarily
  - NSW RR currently has no plans to alter the exposure standard in the WHS (MPS) Regs of 0.1mg/m3

Resources Regulator
Department of Regional NSW

Thank You

NSW GOVERNMENT

Mining and Petroleum Competence Board

Overview

Joanne Muller AM
Chair, Mining and Petroleum Competence Board

23 August 2023

Role of the Mining and Petroleum Competence Board

The Mining and Petroleum Competence Board (MPCB) makes recommendations to the Minister, the Hon Courtney Houssos MLC and the NSW Resources Regulator on:

The development of competence standards

Processes for assessment of competence

Requirements for the maintenance of competence

Conditions on practising certificates

Constituency of the Board

Independent Chair

- 3 employer representatives
- (NSW Minerals Council and CCAA)
- 3 worker representatives (MEU and AWU)
- 2 Department representatives
- 2 independent members

The Board is supported by:

- the Resources Regulator Competencies and Authorisations Unit
- the Mining, Exploration and Geoscience Secretariat.

Activities of the Board

Typical meeting agenda items

- Qualifications and competency requirements
- Appointment of examiners to examination panels
- Certification outcome reports
- Safety reports
- Items raised by the members.

Current projects

- Review of the competency framework and blueprinting for certificates of competence
- Evaluation of the practising certificate maintenance of competence scheme

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Questions

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Department of Regional NSW

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Central Assessment Unit update

Principal Inspector CAU – Ben Withers

NSW Resources Regulator

August 2023

Injuries – notification

Serious injuries – requiring immediate notification:

- an injured worker is admitted to hospital immediately

Unfit for 7 days

- S124(5)(n)&(o) applies if a worker suffers an injury (n) or illness (o) at work that results in them being unfit for a period of at least 7 days, supported by a medical certificate.
- It is based off 7 days on a medical certificate. This applies for all injuries and illness, including psychosocial hazards.

Adverse health monitoring results

- Area health services are required to notify the regulator of any findings related to mines
- Mines must also notify the regulator when they become aware
- If adverse health monitoring includes exposure to respirable dust, DPM, crystalline silica or CO_2, notification under s124 (high potential incident) is also required
- When you notify, please include details of any actions you have taken

WHS Reg 2017 – 376 Duty to give health monitoring report to regulator

76 Duty to give health monitoring report to regulator

A PCBU for whom a worker is carrying out work for which health monitoring is required must give a copy of the health monitoring report relating to a worker to the regulator as soon as practicable after obtaining the report if the report contains —

(a) any advice that test results indicate that the worker may have contracted a disease, injury or illness as a result of carrying out the work using, handling, generating or storing hazardous chemicals that triggered the requirement for health monitoring, or

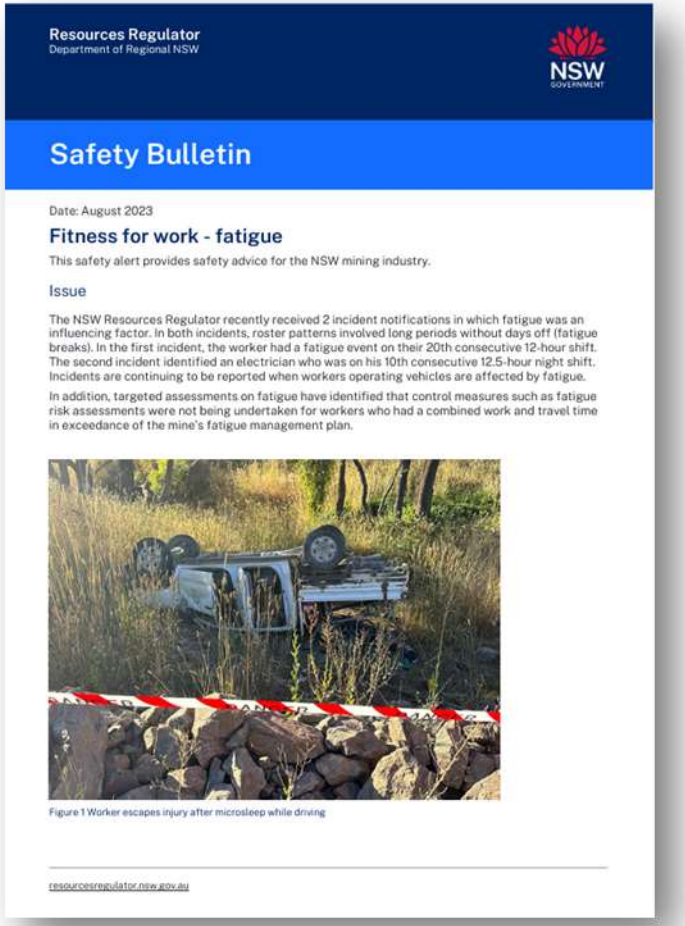
(b) any recommendation that the PCBU take remedial measures, including whether the worker can continue to carry out the work using, handling, generating or storing hazardous chemicals that triggered the requirement for health monitoring.

Safety Bulletin - Fatigue

Driven by several incidents in metals mines:

- Incident 1
  - Contractors working 12 hour shifts 20 days on / 8 days off
  - Fatigue incident occurred on day 20 while driving a haul truck

- Incident 2
  - Worker was on 10th consecutive 12.5hr night shift



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Safety Bulletin

Date: August 2023

Fitness for work - fatigue

This safety alert provides safety advice for the NSW mining industry.

Issue

The NSW Resources Regulator recently received 2 incident notifications in which fatigue was an influencing factor. In both incidents, roster patterns involved long periods without days off (fatigue breaks). In the first incident, the worker had a fatigue event on their 20th consecutive 12-hour shift. The second incident identified an electrician who was on his 10th consecutive 12.5-hour night shift. Incidents are continuing to be reported when workers operating vehicles are affected by fatigue.

In addition, targeted assessments on fatigue have identified that control measures such as fatigue risk assessments were not being undertaken for workers who had a combined work and travel time in exceedance of the mine's fatigue management plan.

Figure 1 Worker escapes injury after microsleep while driving

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Fires on Mobile Plant

- If a fire occurs underground it is a **dangerous incident** and must be reported **immediately**.
- All fires on mobile plant require an ancillary survey to be completed within 28 days.

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Mechanical engineering update

Acting Principal Inspector Mechanical – Greg Connolly

NSW Resources Regulator

August 2023

Mechanical Inspectors – Organisational Chart

Engineering	CAU	COAL	MetEx	Small	Petroleum
Dwaine Jones	Ben Withers	Greg Connolly	John Parolin	Grahame Vernon	Sarfraz Hassan
Ross Stutchbury	Peter Sunol	Peter Berkholz	Brendan Vaughn		
Jeremy U'Brien		Mick Howes	Bill Costello		
		TBA			

Regulator Forums and Seminars

2023 Face to Face Meetings:

Face-to-face provides

- greater networking opportunities
- one-on-one discussion
- environment to build a solid working relationship with both colleagues and inspectors without the distraction of being at work

Mechanical Forum	Date	Venue
Metalliferous Mechanical Forum	29th November	Dubbo RSL
Open Cut Coal Mechanical Forum	5th December	Singleton Diggers
Underground Coal Mechanical Forum	7th December	Penrith Panthers

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Engagement programs

July to December 2023

Compliance priorities – July to December 2023

Open cut and metalliferous - Heavy vehicle interaction

Underground metalliferous - Ventilation management

Small mines - Implementation of WHS(MPS) Regulations 2022

Proactive assessment programs

Metalliferous and Petroleum sector

- Roads and Vehicle Operating Areas (underground)
- Ventilation control plan (underground)
- Health Control Plan (surface mines)
- Falling objects (surface and processing plants)
- Ground or strata failure – slope stability (surface and processing plants)
- Structural Integrity (surface and underground)
- Electrical Control Plans (surface and underground)
- Well safety inspections (petroleum)
- Exploration drills

Proactive assessment programs

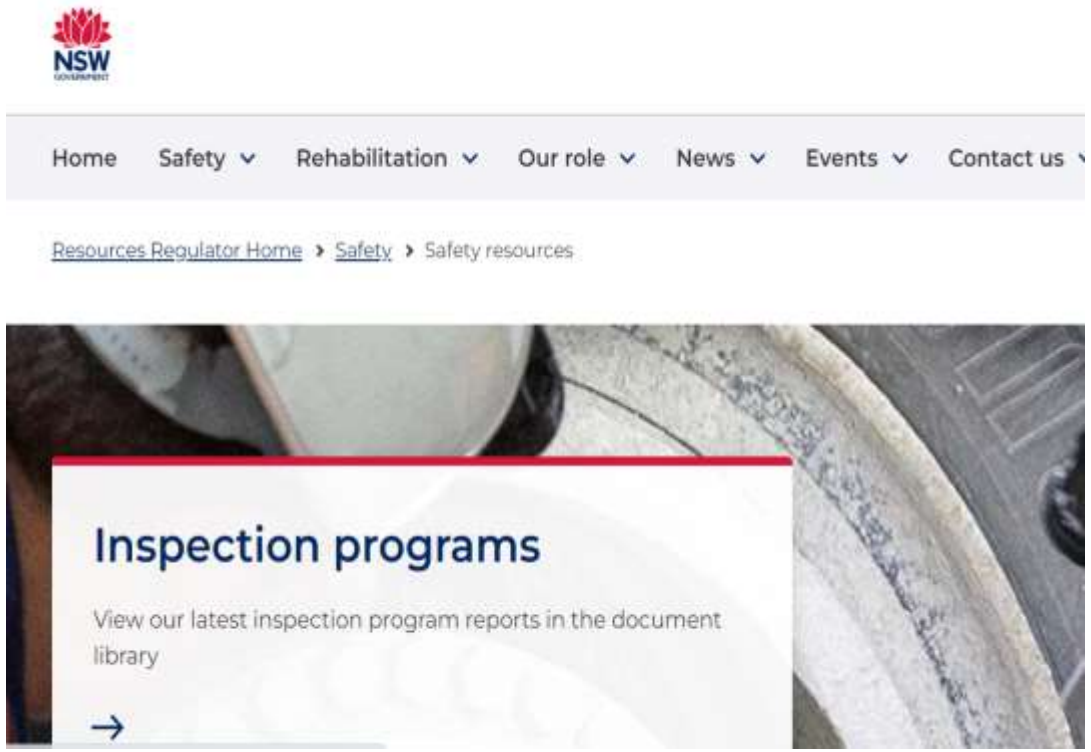
Small mines sector

- Working at Heights
- Mobile Plant Safety
- Principal Hazard Assessments – low risk Tier 2 and Tier 3 operations
- Electrical control plan

These assessment programs will include both targeted assessments and planned inspections. Targeted assessments may not necessarily be undertaken at every mine.

Assessment programs – information release

Details of upcoming assessment programs along with supporting fact sheet can be found on our webpage.



https://www.resourcesregulator.nsw.gov.au/safety/inspection-programs

Assessment programs reports – 12 months

Date	Assessment Program	Area
June 23	Falling objects – lifting and cranage	Coal
April 23	ROVOA unplanned movement UG	UG coal
Feb 23	Ground or strata failure	UG MetEx
Feb 23	Mine shafts and winding systems	MetEx
Feb 23	Falling objects – lifting and cranage	Tier 1, surface MetEx
Feb 23	Ground or strata – secondary extraction	UG coal
Jan 23	Emergency planning self escape refuge	UG mines
Aug 22	Entanglement	MetEx
Aug 22	Fire or explosion – mechanical	UG coal

https://www.resourcesregulator.nsw.gov.au/safety/inspection-programs

Technical reference guides

Issued:

- Stockpiles and reclaim tunnels (MDG 28)

The following are being prepared to go out for targeted industry feedback:

- TRG Fluid Power - MDG 3007 Hydraulic safety has been merged into MDG41
- TRG Management of diesel engine pollutants

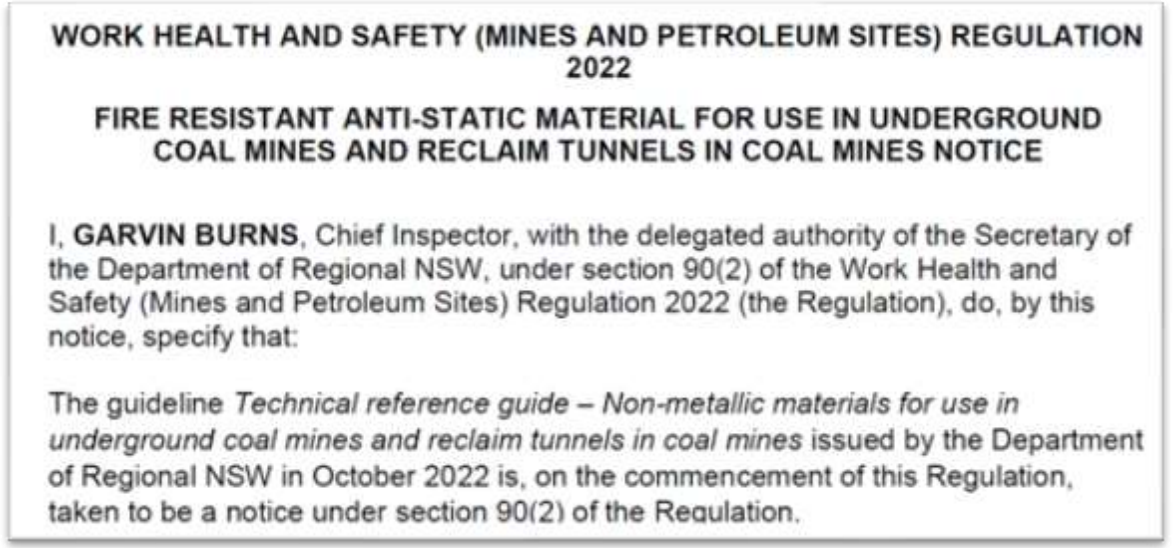
The following are currently being updated:

- MDG 35.1 Drilling and bolting UG coal mines
- TRG Transport Braking Systems

NSW Government Gazettal notices

NSW government gazette n2023-0027 was published under section 90(2) of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2022 on the 11 January 2023 for the technical reference guide – Non metallic material for use in underground coal mines and reclaim tunnels.

(3) The mine operator of a coal mine must ensure an item of plant specified in a notice under this section is not used at the mine unless it has been tested and certified in accordance with the notice.



WORK HEALTH AND SAFETY (MINES AND PETROLEUM SITES) REGULATION 2022

FIRE RESISTANT ANTI-STATIC MATERIAL FOR USE IN UNDERGROUND COAL MINES AND RECLAIM TUNNELS IN COAL MINES NOTICE

I, **GARVIN BURNS**, Chief Inspector, with the delegated authority of the Secretary of the Department of Regional NSW, under section 90(2) of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2022 (the Regulation), do, by this notice, specify that:

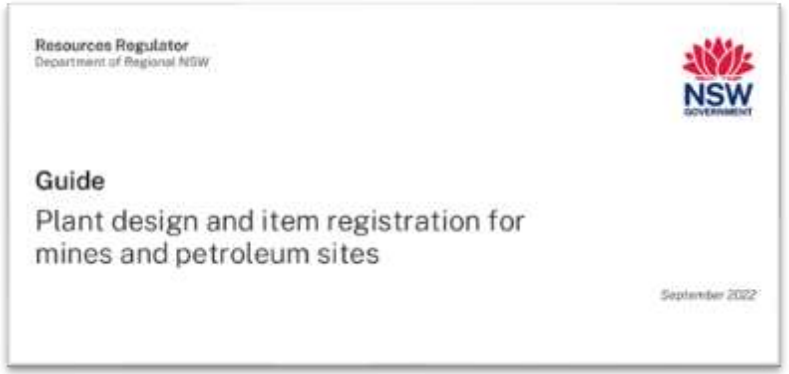
The guideline *Technical reference guide – Non-metallic materials for use in underground coal mines and reclaim tunnels in coal mines* issued by the Department of Regional NSW in October 2022 is, on the commencement of this Regulation, taken to be a notice under section 90(2) of the Regulation.

Implementation

Workshop March 2023

The regulator has published the following to assist in the registration process:

- Guide for plant design and item registration
- A position paper on the use of alternative component parts in design registered plant.
- General information on the eligibility criteria for design verifiers.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Department of Regional NSW

Guide

Plant design and item registration for mines and petroleum sites

September 2022


Resources Regulator
Department of Regional NSW

December 2022

Use of alternative component parts in design registered plant (fit form function)

Position Paper

Introduction

Mine operators or persons in control of design registered plant are responsible for maintaining the plant in accordance with its design registration, item registration (where applicable) and the manufacturers recommendations.

Circumstances may exist or develop throughout the operating lifecycle of design registered plant, where the use of alternate parts[1] may be required for plant to remain operational or may present significant operational efficiency benefits.

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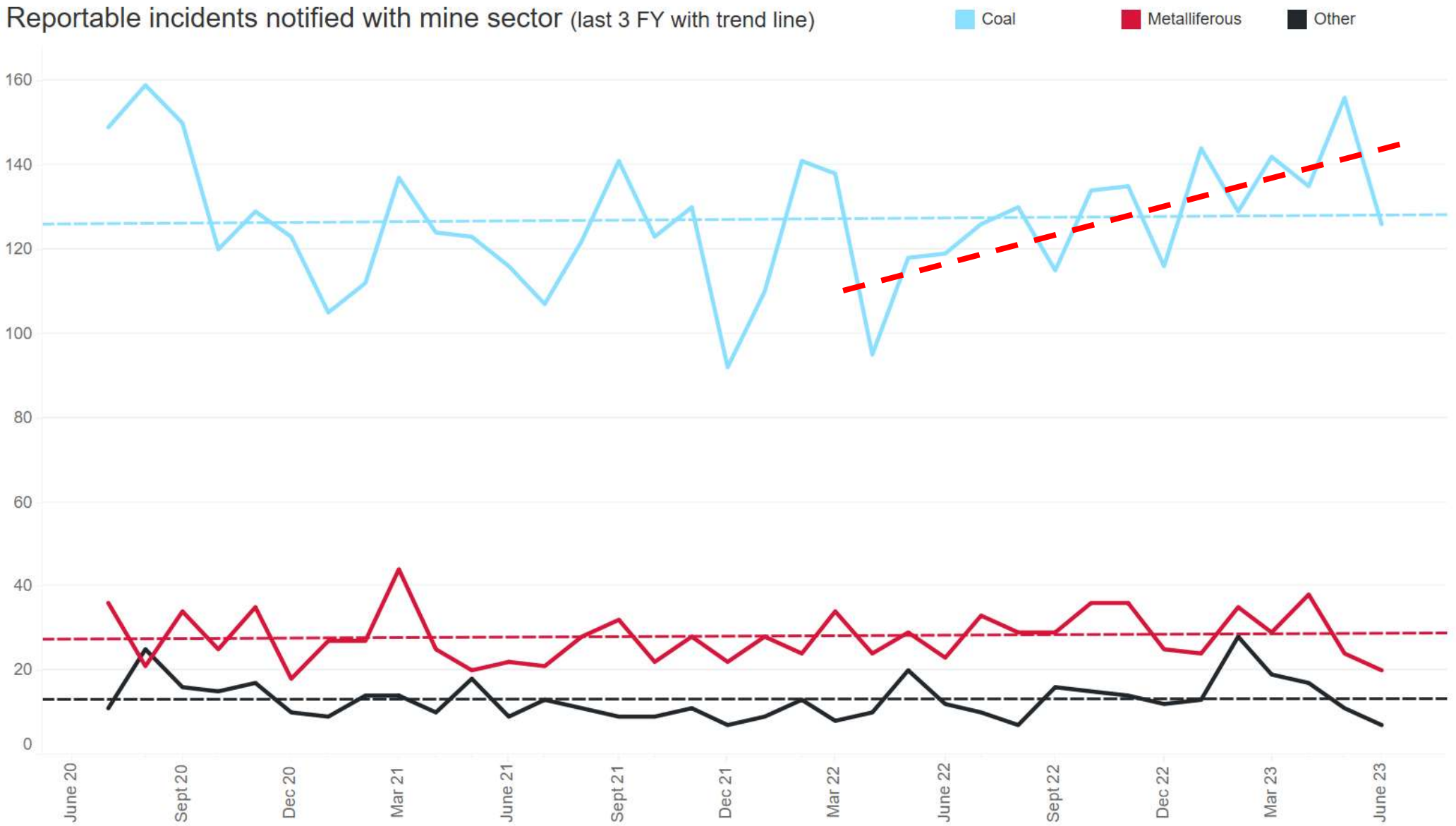
Mechanical Incidents

July 2022 to July 2023

Incident Data - Last 3 years



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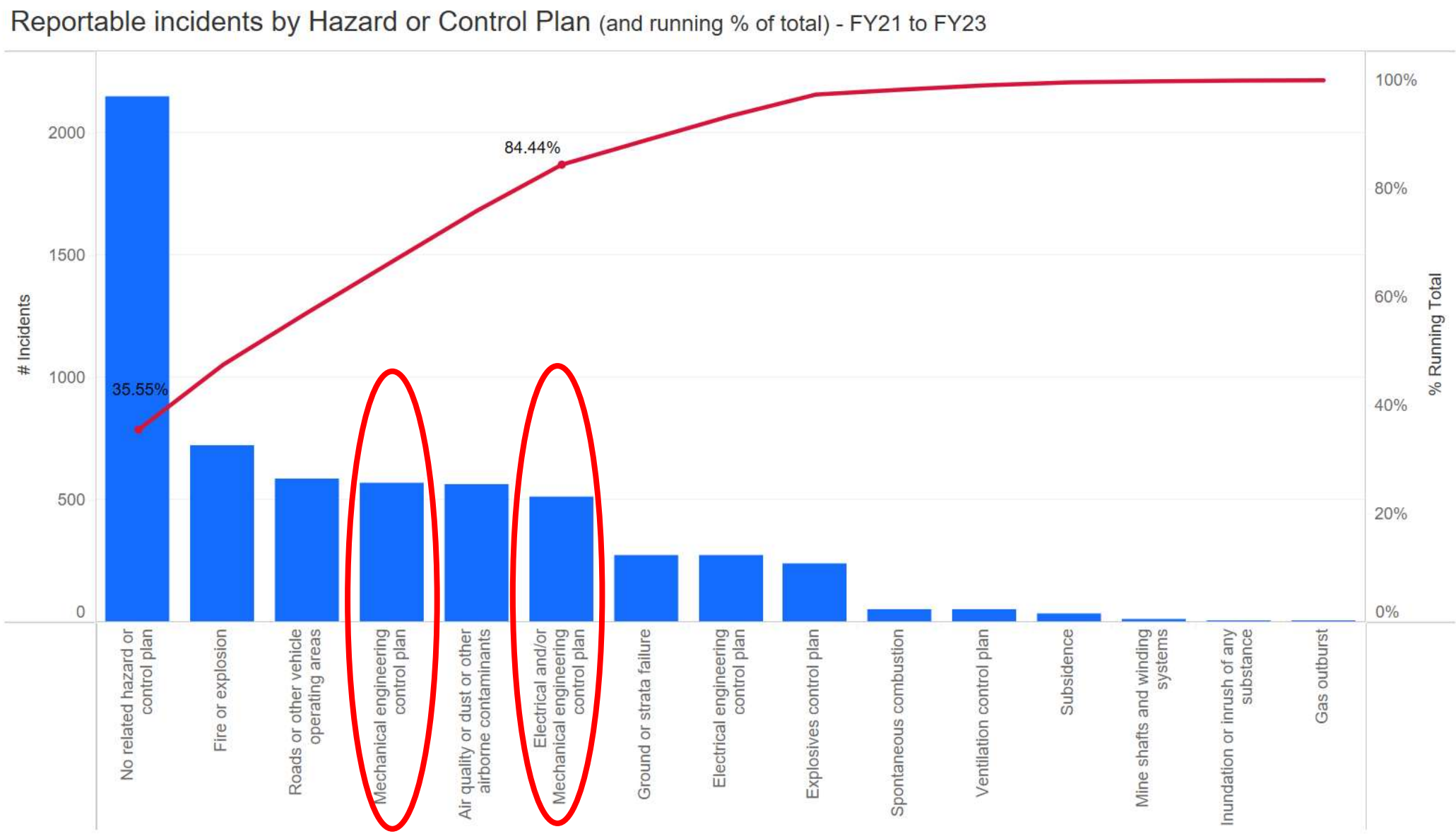

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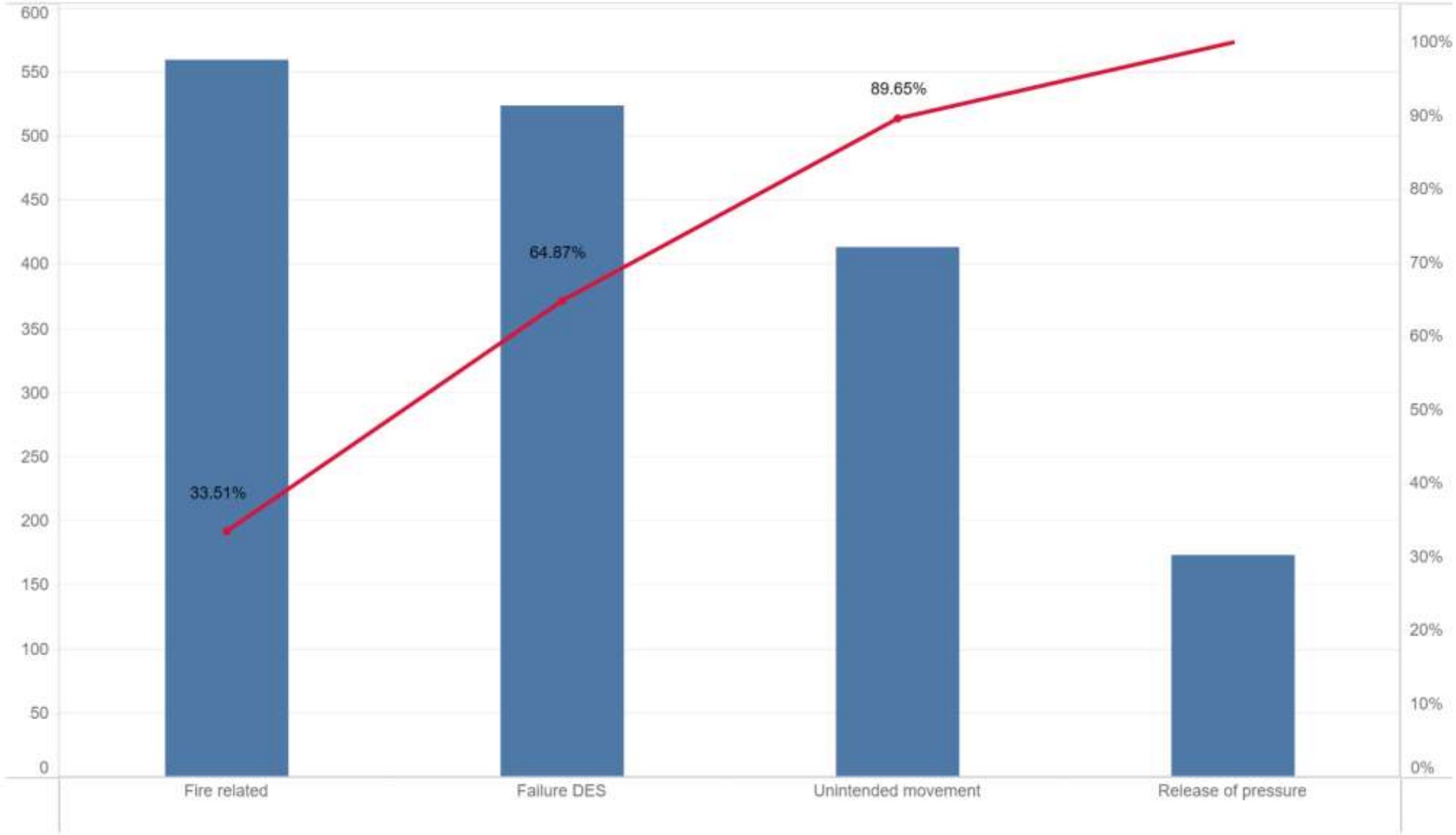

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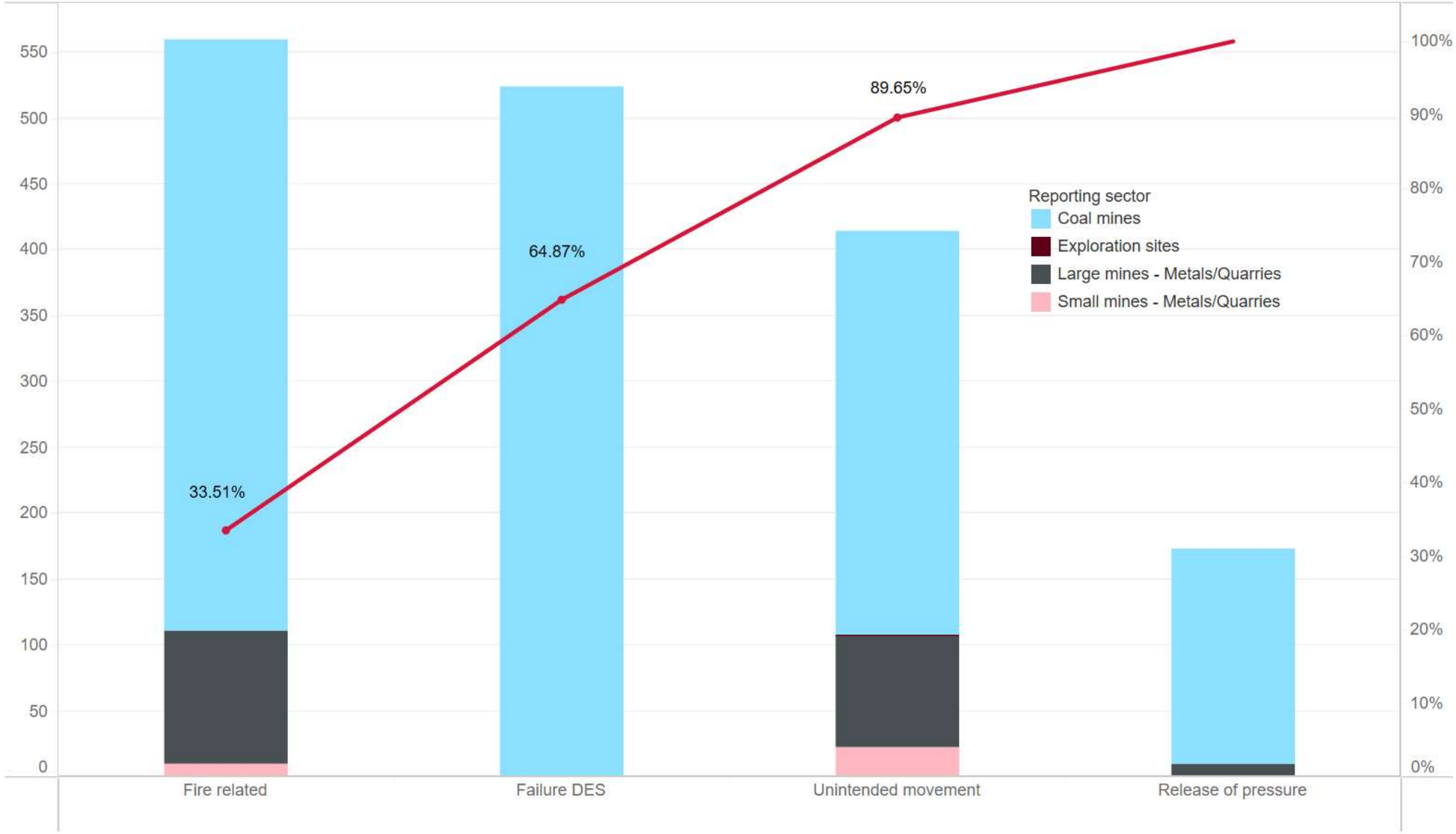


Last 12 months publications:

Safety Alerts

Safety Bulletins

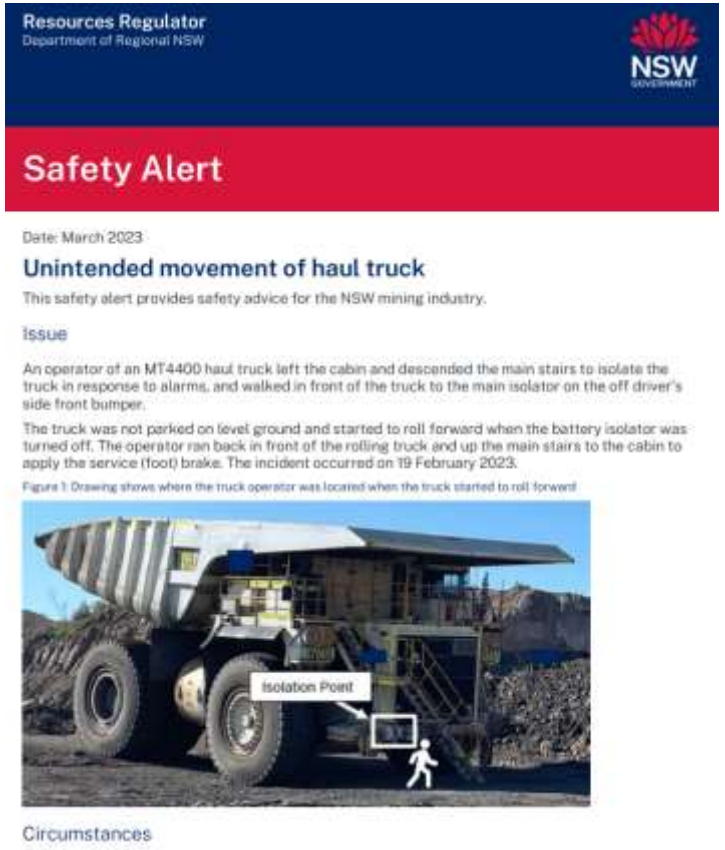
Incident Investigation Report

Safety alerts

SA23-01

Released in March 2023

Unintended movement of haul truck



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Safety Alert

Date: March 2023

Unintended movement of haul truck

This safety alert provides safety advice for the NSW mining industry.

Issue

An operator of an MT4400 haul truck left the cabin and descended the main stairs to isolate the truck in response to alarms, and walked in front of the truck to the main isolator on the off driver's side front bumper.

The truck was not parked on level ground and started to roll forward when the battery isolator was turned off. The operator ran back in front of the rolling truck and up the main stairs to the cabin to apply the service (foot) brake. The incident occurred on 19 February 2023.

Figure 1: Drawing shows where the truck operator was located when the truck started to roll forward

Circumstances

Safety alerts

SA22-06

Released in October 2022

Operator unable to activate fire suppression system

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Department of Regional NSW

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Safety Alert

Date: October 22

Operator unable to activate fire suppression system during emergency

This safety alert provides safety advice for the NSW mining industry.

Issue

When a fire occurred on a dozer, the operator tried to activate the fire suppression system when the panel cover separated from the mounting bracket, forcing the operator to abandon the plant.

Figure 1 - Actuator panel separated from the mounting bracket

Safety alerts

SA22-05

Released in October 2022

Service brakes fail on moving artic dump truck

Resources Regulator
Department of Regional NSW

NSW GOVERNMENT

Safety Alert

Date: October 2022

Service brakes fail on moving articulated dump truck

This safety alert provides safety advice for the NSW mining industry.

Issue

A loaded Caterpillar 740 articulated ejector truck ran out of diesel fuel and shut down ascending a 10% gradient.

The truck stopped, then rolled backwards for 49 m when the truck's service brakes (dynamic brakes) failed. The truck was only brought to rest when the park brake was activated. Park brakes are not designed for dynamic applications.

Service braking systems on mobile plant are safety critical systems. Their failure during operation has potential for fatal consequences. This incident highlights the importance of:

1. maintaining hydraulic accumulators on service and secondary braking systems, and
2. ensuring identified defects are assessed and repaired in a timely manner.

Circumstances

The operator of the truck was transporting gravel from a crusher to a stockpile when the truck lost drive while travelling up a 10% ramp on 13 July 2022. The truck was hired but being operated by the mine.

As the truck has begun to roll backwards, the operator attempted to apply the service brake. The brake pedal had no resistance, and the service brake did not apply. As the truck continued to roll backwards, the operator used the park brake to stop the truck. The park brake was difficult to engage and required several attempts. The truck rolled 48.8 m before coming to a stop.

The fuel tank was empty, and the fuel gauge was faulty. At the time of the event the fuel gauge was reading at a quarter full.

Safety alerts

SA22-04

Released in October 2022

Dangers of lifting and pulling activities

Resources Regulator
Department of Regional NSW

NSW GOVERNMENT

Safety Alert

Date: October 2022

Dangers of lifting and pulling activities revealed

This safety alert provides safety advice for the NSW mining industry.

Issue

Two workers have suffered injuries within 3 days during lifting and pulling activities at 2 NSW underground coal mines.

In consideration of the circumstances of each incident, it was fortunate the injuries were not far worse.

Circumstances

First incident

A mechanical tradesman was separating a longwall tailgate drive from the 4 tailgate roof supports. The mine was using an alternate set of longwall equipment to mine another panel and this equipment had not been used for months.

The worker was instructed to inspect the task and determine the best way to carry out the task. Multiple methods were possible.

The relay bar clevis pins were successfully removed from roof supports 141 and 142 using a lever hoist anchored to the roof support canopy and the hook attached to a lug on top of the pins. The same method was attempted for roof supports 143 and 144.

The lug on top of the clevis pin on roof support 144 was damaged but the pin was sitting high in the relay bar. This allowed the worker to wrap the chain of the lever hoist around the pin, attaching the hook back onto the chain (choking the chain around the pin). Load was applied to the lever hoists on both supports but the clevis pins did not move.

A heavy lift machine was then used to move the tailgate drive to try to loosen the pins. This assisted with the pin on roof support 143. The worker then went to apply further load to the lever hoist on roof support 144.

As the worker applied additional loaded to the lever hoist, the chain and hook has slipped off the pin and flung upwards, striking the worker on the cheek. The worker was taken to hospital by ambulance.

Safety alerts

SA22-03

Released in September 2022

Worker swims to shore after pontoon and boat sink

NSW Resources Regulator

SAFETY ALERT

DATE: September 2022

Worker swims to shore after pontoon pump and boat sink

This safety alert provides safety advice for the NSW mining industry.

Issue

A maintenance contractor had to swim to shore without a floatation device, when a pontoon pump overturned and sank, dragging his boat underwater with it.

The contractor was working at Ravensworth coal handling processing plant (CHPP) in the NSW Hunter Valley when tasked with servicing a pump on a pontoon on 17 August 2022.

Circumstances

The worker used a boat to access the pontoon. The pontoon and pump configuration had a dry weight of about 15.7 tonnes and a wet weight (fuel/water in pump line) of about 17 tonnes. The pontoon had a cube container filled with water on one side as a ballast control.

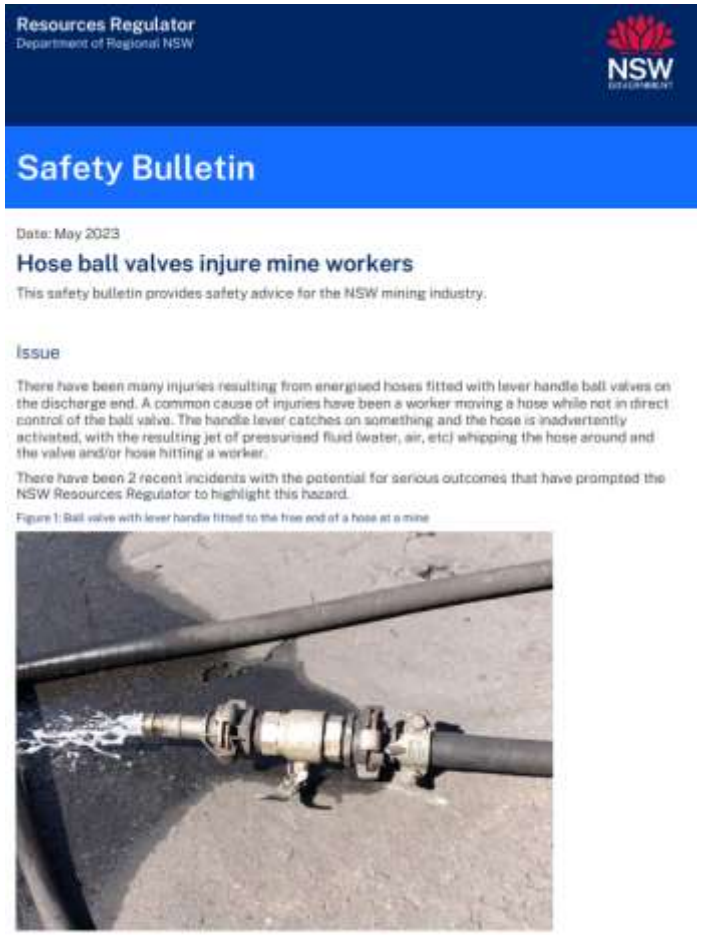
While doing the service, the worker identified that a pulley on the primer pump (vacuum) was faulty. He had taken off his floatation device to carry out his work, as it was not required by the mine operator.

The primer pump was removed while draining the water line and put into the boat.

The subsequent change in the centre of gravity of the whole unit caused the pontoon to overbalance and overturn.

Within minutes, the worker noticed the pontoon tilt and jumped in the water to swim 30 m to the bank. As he swam, the pontoon overturned, dragging the boat under the water with it. The worker was not injured.

Safety bulletins



Resources Regulator
Department of Regional NSW

NSW

Safety Bulletin

Date: May 2023

Hose ball valves injure mine workers

This safety bulletin provides safety advice for the NSW mining industry.

Issue

There have been many injuries resulting from energised hoses fitted with lever handle ball valves on the discharge end. A common cause of injuries have been a worker moving a hose while not in direct control of the ball valve. The handle lever catches on something and the hose is inadvertently activated, with the resulting jet of pressurised fluid (water, air, etc) whipping the hose around and the valve and/or hose hitting a worker.

There have been 2 recent incidents with the potential for serious outcomes that have prompted the NSW Resources Regulator to highlight this hazard.

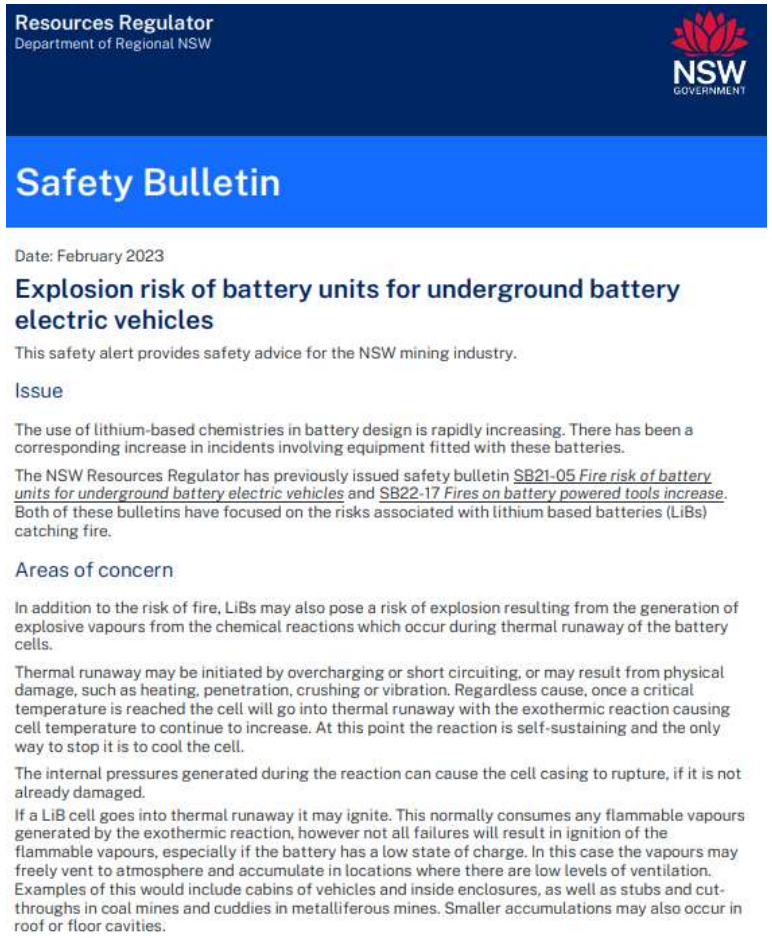
Figure 1: Ball valve with lever handle fitted to the free end of a hose at a mine

SB23-04

Released in May 2023

Hose ball valves injure mine workers

Safety bulletins



Resources Regulator
Department of Regional NSW

NSW GOVERNMENT

Safety Bulletin

Date: February 2023

Explosion risk of battery units for underground battery electric vehicles

This safety alert provides safety advice for the NSW mining industry.

Issue

The use of lithium-based chemistries in battery design is rapidly increasing. There has been a corresponding increase in incidents involving equipment fitted with these batteries.

The NSW Resources Regulator has previously issued safety bulletin SB21-05 *Fire risk of battery units for underground battery electric vehicles* and SB22-17 *Fires on battery powered tools increase*. Both of these bulletins have focused on the risks associated with lithium based batteries (LiBs) catching fire.

Areas of concern

In addition to the risk of fire, LiBs may also pose a risk of explosion resulting from the generation of explosive vapours from the chemical reactions which occur during thermal runaway of the battery cells.

Thermal runaway may be initiated by overcharging or short circuiting, or may result from physical damage, such as heating, penetration, crushing or vibration. Regardless cause, once a critical temperature is reached the cell will go into thermal runaway with the exothermic reaction causing cell temperature to continue to increase. At this point the reaction is self-sustaining and the only way to stop it is to cool the cell.

The internal pressures generated during the reaction can cause the cell casing to rupture, if it is not already damaged.

If a LiB cell goes into thermal runaway it may ignite. This normally consumes any flammable vapours generated by the exothermic reaction, however not all failures will result in ignition of the flammable vapours, especially if the battery has a low state of charge. In this case the vapours may freely vent to atmosphere and accumulate in locations where there are low levels of ventilation. Examples of this would include cabins of vehicles and inside enclosures, as well as stubs and cut-throughs in coal mines and cuddies in metalliferous mines. Smaller accumulations may also occur in roof or floor cavities.

SB23-01

Released in February 2023

Explosion risk of battery units for underground battery electric vehicles

Safety bulletins

Resources Regulator
Department of Regional NSW

Safety Bulletin

Date: December 2022

Fires on battery powered tools increase

This safety alert provides safety advice for the NSW mining industry.

Issue

There has been a steady increase in the number of fires associated with portable tools that use lithium-ion and lithium polymer batteries as an energy source.

Lithium-ion and lithium polymer batteries are the preferred energy source for portable tools due to the high levels of energy that the batteries provide. However, this introduces the risk of fire or explosion when batteries and battery charging equipment are not used according to the manufacturers' safety directions.

Batteries can enter a state of 'thermal runaway' when subjected to over-charging, damage or abuse. Abuse includes dropping, crushing, piercing, or being subjected to vibration or higher than normal temperatures from external heat sources. Depending on the state of charge of the battery, thermal runaway may lead to rupturing the battery cells with subsequent fire resulting in the complete destruction of the battery, or the production of a vapour cloud with significant explosion risk and toxic gases. Any subsequent fire or explosion may place people at serious risk of injury and also result in damage to other plant and materials.

The Work Health and Safety (Mines and Petroleum Sites) Regulation 2022 Schedule 2 (3) Electrical Engineering Control Plans section 2 requires the control plan to set out control measures for the risk to health and safety from the occurrence of uncontrolled fires.

Incidents

Incidents of lithium-ion battery fires that have occurred include:

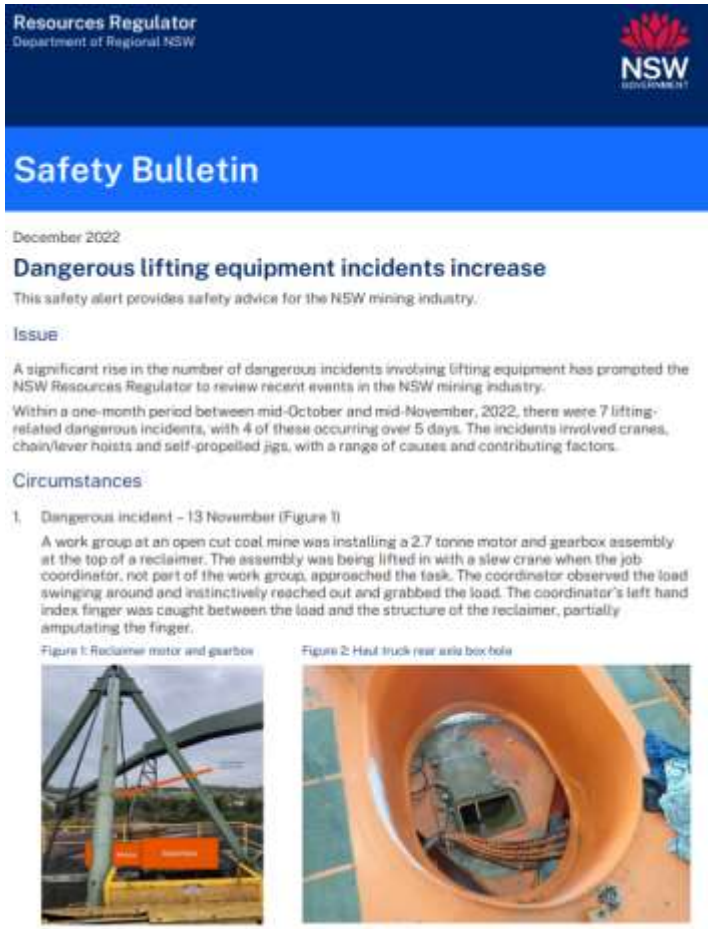
- a lithium-ion battery caught fire while being transported in a tool bag in the back of a work utility at an open cut mine. The battery was free to move within the tool bag and was possibly short circuited.
- a lithium-ion battery caught fire while connected to a charger in an underground mine. The fault was identified as being caused by moisture ingress, which led to thermal runaway of the battery.
- a lithium-ion battery was left unattended on the back seat of a utility. The inside temperature of the vehicle exceeded the maximum recommended temperature for the battery and resulted in the battery catching fire.
- a lithium-ion battery caught fire when run over after falling out of a man basket in an underground mine.

SB22-17

Released in December 2022

Fires on battery powered tools increase

Safety bulletins



Resources Regulator
Department of Regional NSW

NSW

Safety Bulletin

December 2022

Dangerous lifting equipment incidents increase

This safety alert provides safety advice for the NSW mining industry.

Issue

A significant rise in the number of dangerous incidents involving lifting equipment has prompted the NSW Resources Regulator to review recent events in the NSW mining industry.

Within a one-month period between mid-October and mid-November, 2022, there were 7 lifting-related dangerous incidents, with 4 of these occurring over 5 days. The incidents involved cranes, chain/lever hoists and self-propelled jigs, with a range of causes and contributing factors.

Circumstances

1. Dangerous incident – 13 November (Figure 1)

   A work group at an open cut coal mine was installing a 2.7 tonne motor and gearbox assembly at the top of a reclaimer. The assembly was being lifted in with a slew crane when the job coordinator, not part of the work group, approached the task. The coordinator observed the load swinging around and instinctively reached out and grabbed the load. The coordinator's left hand index finger was caught between the load and the structure of the reclaimer, partially amputating the finger.

Figure 1: Reclaimer motor and gearbox

Figure 2: Haul truck rear axle box hole

SB22-14

Released in December 2022

Dangerous lifting equipment incidents increase

Safety bulletins

NSW GOVERNMENT

NSW Resources Regulator

SAFETY BULLETIN

SEPTEMBER 2022

Fires occurring on mobile manufacturing unit trucks

This safety bulletin provides safety advice for the NSW mining industry.

Issue

The NSW Resources Regulator recently identified 2 incidents involving fires on mobile plant that have occurred on explosives mobile manufacturing unit (MMU) trucks.

While the fires were very small and quickly extinguished, explosives and oxidising agents such as ammonium nitrate present a high risk with potentially severe consequences in the event of being involved in a fire. The MMU fires were both at bulk explosives storage and reload facilities.

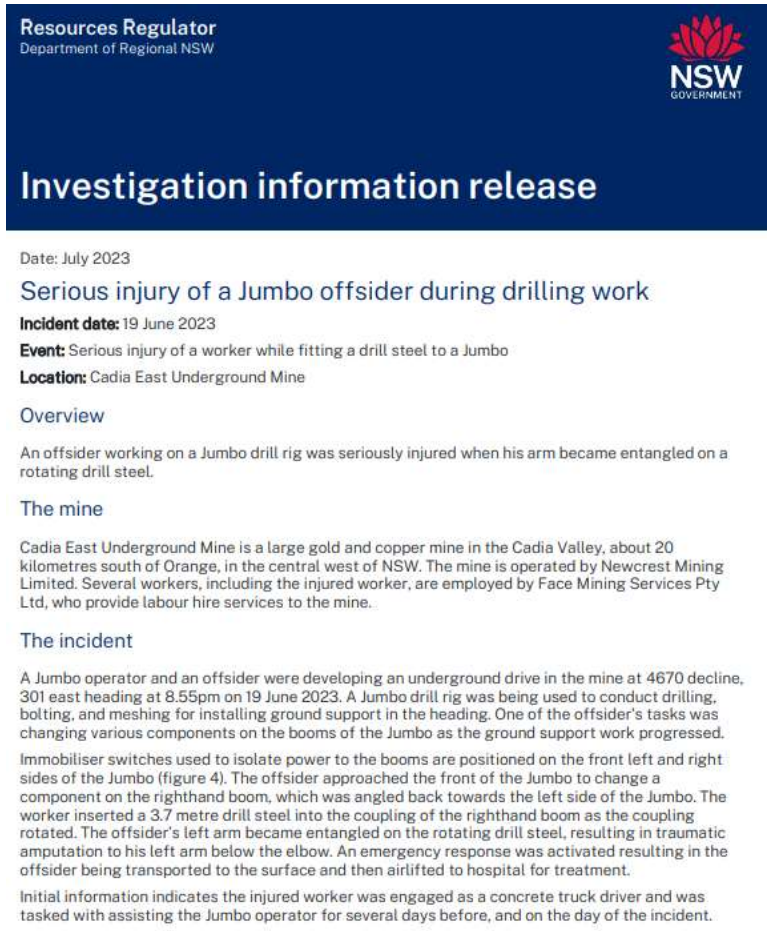
Figure 1 MMU truck moved away from bulk storage after a fire was detected

SB22-12

Released in September 2022

Fires occurring on mobile manufacturing unit trucks

Incident Information Release



Resources Regulator
Department of Regional NSW

NSW GOVERNMENT

Investigation information release

Date: July 2023

Serious injury of a Jumbo offsider during drilling work

Incident date: 19 June 2023

Event: Serious injury of a worker while fitting a drill steel to a Jumbo

Location: Cadia East Underground Mine

Overview

An offsider working on a Jumbo drill rig was seriously injured when his arm became entangled on a rotating drill steel.

The mine

Cadia East Underground Mine is a large gold and copper mine in the Cadia Valley, about 20 kilometres south of Orange, in the central west of NSW. The mine is operated by Newcrest Mining Limited. Several workers, including the injured worker, are employed by Face Mining Services Pty Ltd, who provide labour hire services to the mine.

The incident

A Jumbo operator and an offsider were developing an underground drive in the mine at 4670 decline, 301 east heading at 8.55pm on 19 June 2023. A Jumbo drill rig was being used to conduct drilling, bolting, and meshing for installing ground support in the heading. One of the offsider's tasks was changing various components on the booms of the Jumbo as the ground support work progressed.

Immobiliser switches used to isolate power to the booms are positioned on the front left and right sides of the Jumbo (figure 4). The offsider approached the front of the Jumbo to change a component on the righthand boom, which was angled back towards the left side of the Jumbo. The worker inserted a 3.7 metre drill steel into the coupling of the righthand boom as the coupling rotated. The offsider's left arm became entangled on the rotating drill steel, resulting in traumatic amputation to his left arm below the elbow. An emergency response was activated resulting in the offsider being transported to the surface and then airlifted to hospital for treatment.

Initial information indicates the injured worker was engaged as a concrete truck driver and was tasked with assisting the Jumbo operator for several days before, and on the day of the incident.

July 2023

Serious injury of a Jumbo offsider during drilling work

Incident Information Release

Resources Regulator
Department of Regional NSW

NSW GOVERNMENT

Investigation information release

Date: May 2023

Fatality in underground opal mine

Incident date: 28 April 2023

Event: Fatality in an underground opal mine

Location: Coocoran opal field.

Overview

An opal miner was found deceased at the base of a 20 metre opal mine shaft.

The mine

Mineral claim 61376 is a standard class A mineral claim in an area known as 'Emu's' within the Coocoran opal fields located about 30 km north of Lightning Ridge NSW. The miner had held the claim since September 2020.

The incident

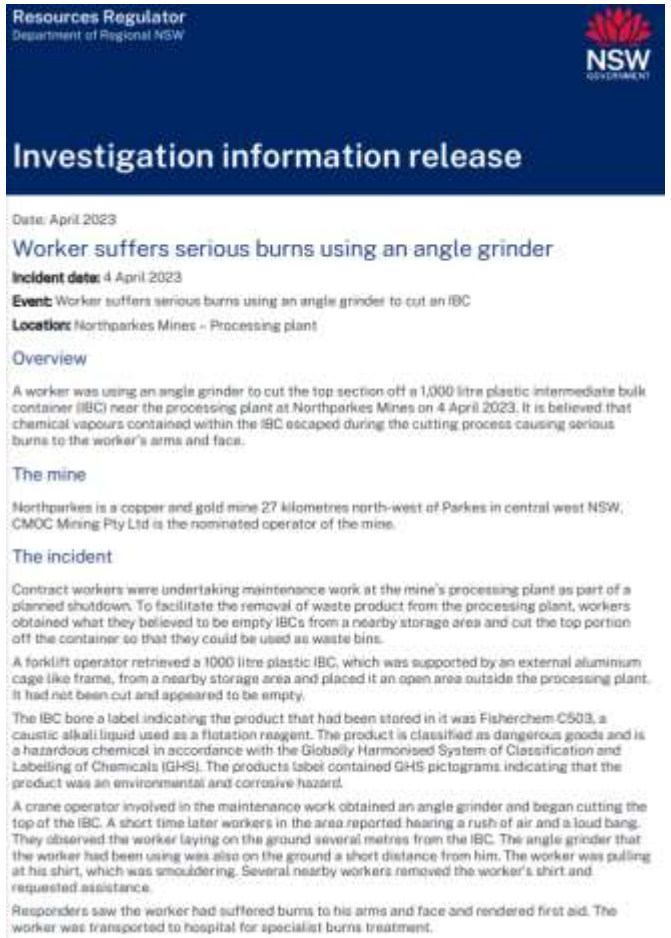
The miner was seen leaving Lightning Ridge to attend his opal claim about 6.30 am on Friday 28 April 2023. The miner was known to work the claim alone. Friends of the miner attended his claim about 5.30 pm because they had not heard from him for several hours and were concerned for his welfare. The miner was later found deceased near the base of the shaft.

An examination of the scene found the person riding hoist and pendant control at the bottom of the shaft with the steel cable fully unspooled from the hoist's drum. The hoist's emergency arresting (lockout) device did not appear to have engaged. The hoist was operated by a Conon single phase 2 HP motor and worm drive gearbox.

May 2023

Fatality in underground opal mine

Incident Information Release



Resources Regulator
Department of Regional NSW

NSW GOVERNMENT

Investigation information release

Date: April 2023

Worker suffers serious burns using an angle grinder

Incident date: 4 April 2023

Event: Worker suffers serious burns using an angle grinder to cut an IBC

Location: Northparkes Mines – Processing plant

Overview

A worker was using an angle grinder to cut the top section off a 1,000 litre plastic intermediate bulk container (IBC) near the processing plant at Northparkes Mines on 4 April 2023. It is believed that chemical vapours contained within the IBC escaped during the cutting process causing serious burns to the worker's arms and face.

The mine

Northparkes is a copper and gold mine 27 kilometres north-west of Parkes in central west NSW. CMOC Mining Pty Ltd is the nominated operator of the mine.

The incident

Contract workers were undertaking maintenance work at the mine's processing plant as part of a planned shutdown. To facilitate the removal of waste product from the processing plant, workers obtained what they believed to be empty IBCs from a nearby storage area and cut the top portion off the container so that they could be used as waste bins.

A forklift operator retrieved a 1000 litre plastic IBC, which was supported by an external aluminium cage like frame, from a nearby storage area and placed it an open area outside the processing plant. It had not been cut and appeared to be empty.

The IBC bore a label indicating the product that had been stored in it was Fisherchem C503, a caustic alkali liquid used as a flotation reagent. The product is classified as dangerous goods and is a hazardous chemical in accordance with the Globally Harmonised System of Classification and Labelling of Chemicals (GHS). The products label contained GHS pictograms indicating that the product was an environmental and corrosive hazard.

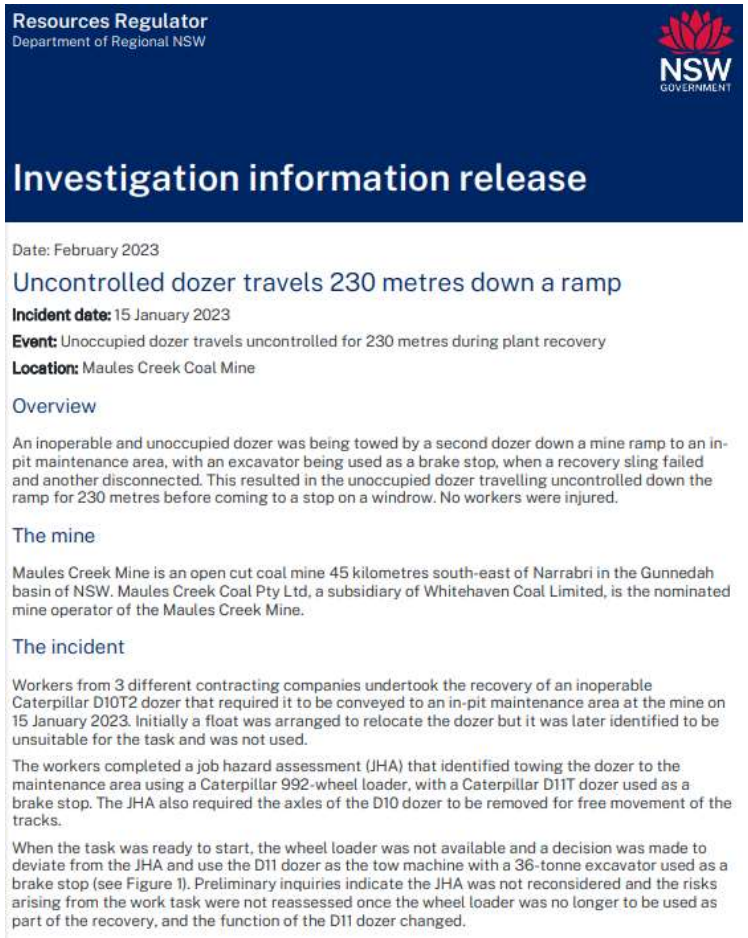
A crane operator involved in the maintenance work obtained an angle grinder and began cutting the top of the IBC. A short time later workers in the area reported hearing a rush of air and a loud bang. They observed the worker laying on the ground several metres from the IBC. The angle grinder that the worker had been using was also on the ground a short distance from him. The worker was pulling at his shirt, which was smouldering. Several nearby workers removed the worker's shirt and requested assistance.

Responders saw the worker had suffered burns to his arms and face and rendered first aid. The worker was transported to hospital for specialist burns treatment.

April 2023

Worker suffers serious burns using an angle grinder

Incident Information Release



Resources Regulator
Department of Regional NSW

NSW GOVERNMENT

Investigation information release

Date: February 2023

Uncontrolled dozer travels 230 metres down a ramp

Incident date: 15 January 2023

Event: Unoccupied dozer travels uncontrolled for 230 metres during plant recovery

Location: Maules Creek Coal Mine

Overview

An inoperable and unoccupied dozer was being towed by a second dozer down a mine ramp to an in-pit maintenance area, with an excavator being used as a brake stop, when a recovery sling failed and another disconnected. This resulted in the unoccupied dozer travelling uncontrolled down the ramp for 230 metres before coming to a stop on a windrow. No workers were injured.

The mine

Maules Creek Mine is an open cut coal mine 45 kilometres south-east of Narrabri in the Gunnedah basin of NSW. Maules Creek Coal Pty Ltd, a subsidiary of Whitehaven Coal Limited, is the nominated mine operator of the Maules Creek Mine.

The incident

Workers from 3 different contracting companies undertook the recovery of an inoperable Caterpillar D10T2 dozer that required it to be conveyed to an in-pit maintenance area at the mine on 15 January 2023. Initially a float was arranged to relocate the dozer but it was later identified to be unsuitable for the task and was not used.

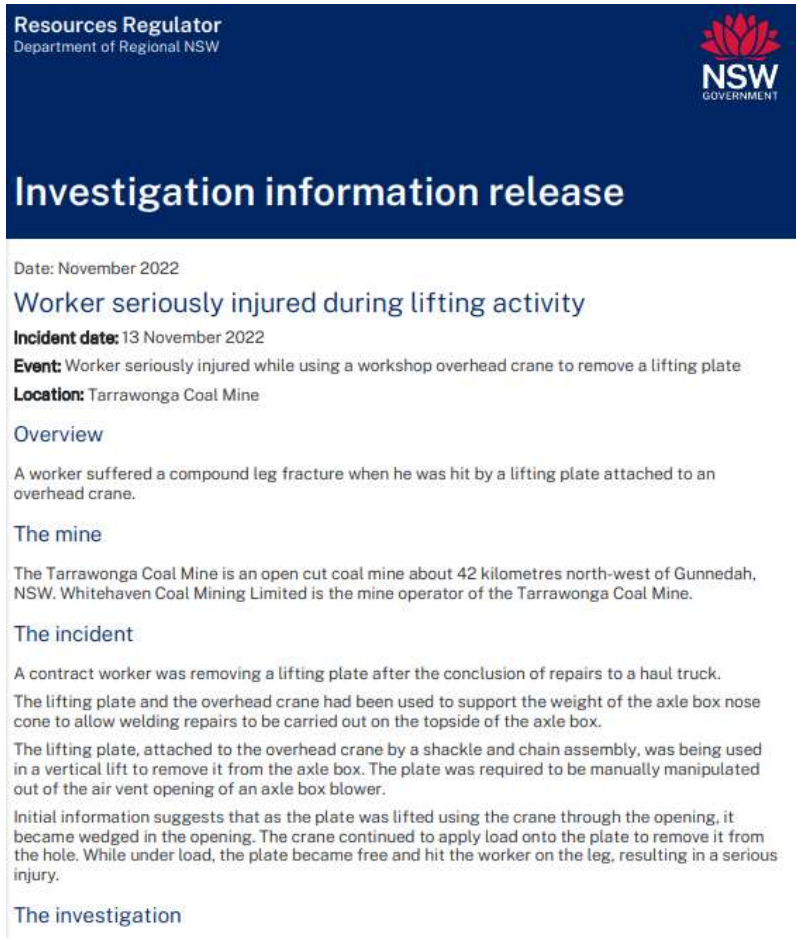
The workers completed a job hazard assessment (JHA) that identified towing the dozer to the maintenance area using a Caterpillar 992-wheel loader, with a Caterpillar D11T dozer used as a brake stop. The JHA also required the axles of the D10 dozer to be removed for free movement of the tracks.

When the task was ready to start, the wheel loader was not available and a decision was made to deviate from the JHA and use the D11 dozer as the tow machine with a 36-tonne excavator used as a brake stop (see Figure 1). Preliminary inquiries indicate the JHA was not reconsidered and the risks arising from the work task were not reassessed once the wheel loader was no longer to be used as part of the recovery, and the function of the D11 dozer changed.

February 2023

Uncontrolled dozer travels 230 meters down a ramp

Incident Information Release



Resources Regulator
Department of Regional NSW

NSW GOVERNMENT

Investigation information release

Date: November 2022

Worker seriously injured during lifting activity

Incident date: 13 November 2022

Event: Worker seriously injured while using a workshop overhead crane to remove a lifting plate

Location: Tarrawonga Coal Mine

Overview

A worker suffered a compound leg fracture when he was hit by a lifting plate attached to an overhead crane.

The mine

The Tarrawonga Coal Mine is an open cut coal mine about 42 kilometres north-west of Gunnedah, NSW. Whitehaven Coal Mining Limited is the mine operator of the Tarrawonga Coal Mine.

The incident

A contract worker was removing a lifting plate after the conclusion of repairs to a haul truck.

The lifting plate and the overhead crane had been used to support the weight of the axle box nose cone to allow welding repairs to be carried out on the topside of the axle box.

The lifting plate, attached to the overhead crane by a shackle and chain assembly, was being used in a vertical lift to remove it from the axle box. The plate was required to be manually manipulated out of the air vent opening of an axle box blower.

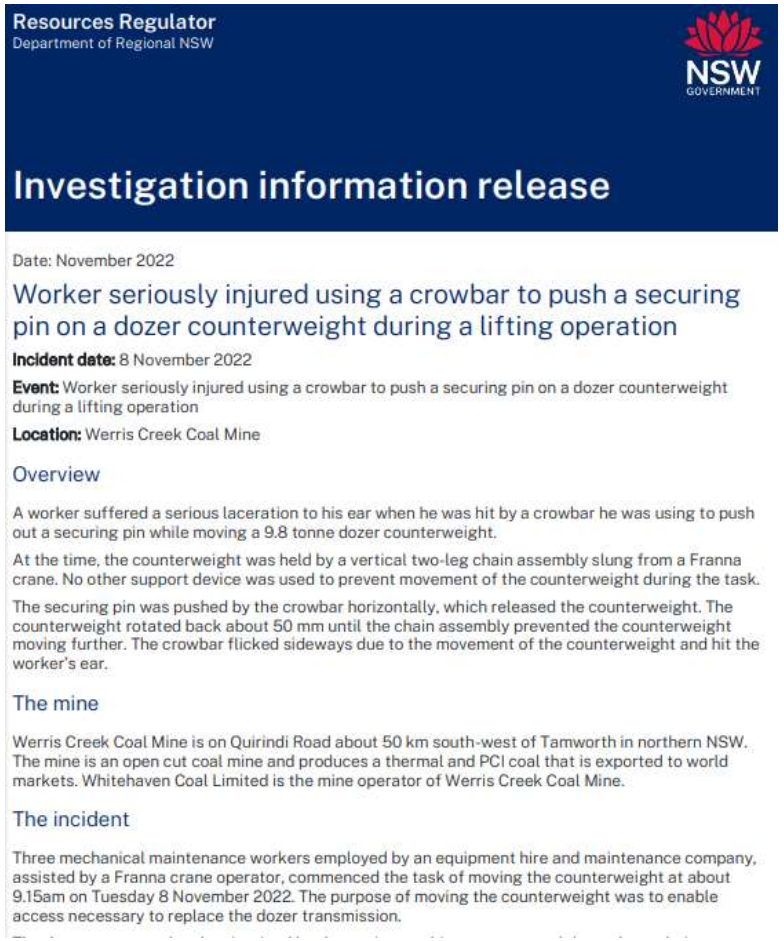
Initial information suggests that as the plate was lifted using the crane through the opening, it became wedged in the opening. The crane continued to apply load onto the plate to remove it from the hole. While under load, the plate became free and hit the worker on the leg, resulting in a serious injury.

The investigation

November 2022

Worker seriously injured during lifting activity

Incident Information Release



Resources Regulator
Department of Regional NSW

NSW GOVERNMENT

Investigation information release

Date: November 2022

Worker seriously injured using a crowbar to push a securing pin on a dozer counterweight during a lifting operation

Incident date: 8 November 2022

Event: Worker seriously injured using a crowbar to push a securing pin on a dozer counterweight during a lifting operation

Location: Werris Creek Coal Mine

Overview

A worker suffered a serious laceration to his ear when he was hit by a crowbar he was using to push out a securing pin while moving a 9.8 tonne dozer counterweight.

At the time, the counterweight was held by a vertical two-leg chain assembly slung from a Franna crane. No other support device was used to prevent movement of the counterweight during the task.

The securing pin was pushed by the crowbar horizontally, which released the counterweight. The counterweight rotated back about 50 mm until the chain assembly prevented the counterweight moving further. The crowbar flicked sideways due to the movement of the counterweight and hit the worker's ear.

The mine

Werris Creek Coal Mine is on Quirindi Road about 50 km south-west of Tamworth in northern NSW. The mine is an open cut coal mine and produces a thermal and PCI coal that is exported to world markets. Whitehaven Coal Limited is the mine operator of Werris Creek Coal Mine.

The incident

Three mechanical maintenance workers employed by an equipment hire and maintenance company, assisted by a Franna crane operator, commenced the task of moving the counterweight at about 9.15am on Tuesday 8 November 2022. The purpose of moving the counterweight was to enable access necessary to replace the dozer transmission.

November 2022

Worker seriously injured using crowbar to push a securing pin on dozer counterweight

Videos and animations available

NSW Resources Regulator – YouTube

Learning from investigations:
Worker slips and falls into conveyo...

Fires on Mobile Plant

Learning from investigations:
Worker injured after being trapped...

NSW GOVERNMENT

Haul truck front suspension strut

Haul Truck Front Strut

Haul Truck Front Strut

Three significant near miss incidents in the last 18 months

Understanding Stored Energy

- Potential energy – suspended or supported mass of strut
- Out of balance load – eccentric mass
- Stored energy in the strut – spring / gas

Issues

- Can have multiple workers in close proximity
- Working under supported load
- Heavy mass 4 – 8 tonnes
- Lack of supervision
- Complacency

General enquiries or technical assistance

For enquiries to the mechanical engineering team either phone

1300 814 609,

or preferably email the Central Assessment Unit (CAU) at cau.regional.nsw.gov.au

who will raise a request for us to get back to you

Telephone menu options:

Option 1 – report a mine safety incident. See **Report an Incident – mine operators** section below for more information.

Option 2 > option 2 – for all licensing and registration enquiries under the WHS Mines & Petroleum Act, or email mca@regional.nsw.gov.au

Option 2 > option 3 – for all practicing certificates, statutory function exams and competency enquiries under the WHS Mines & Petroleum Act, or email mca@regional.nsw.gov.au

Option 2 > option 4 – for all safety general enquiries under the WHS Mine & Petroleum Act, or email cau@regional.nsw.gov.au

Option 2 > option 5 – all compliance matters and enquiries under the Mining Act, or email nswresourcesregulator@service-now.com

Questions?

Resources Regulator
Department of Regional NSW

NSW GOVERNMENT

Electrical engineering update

Owen Barry – Principal Inspector Electrical
NSW Resources Regulator

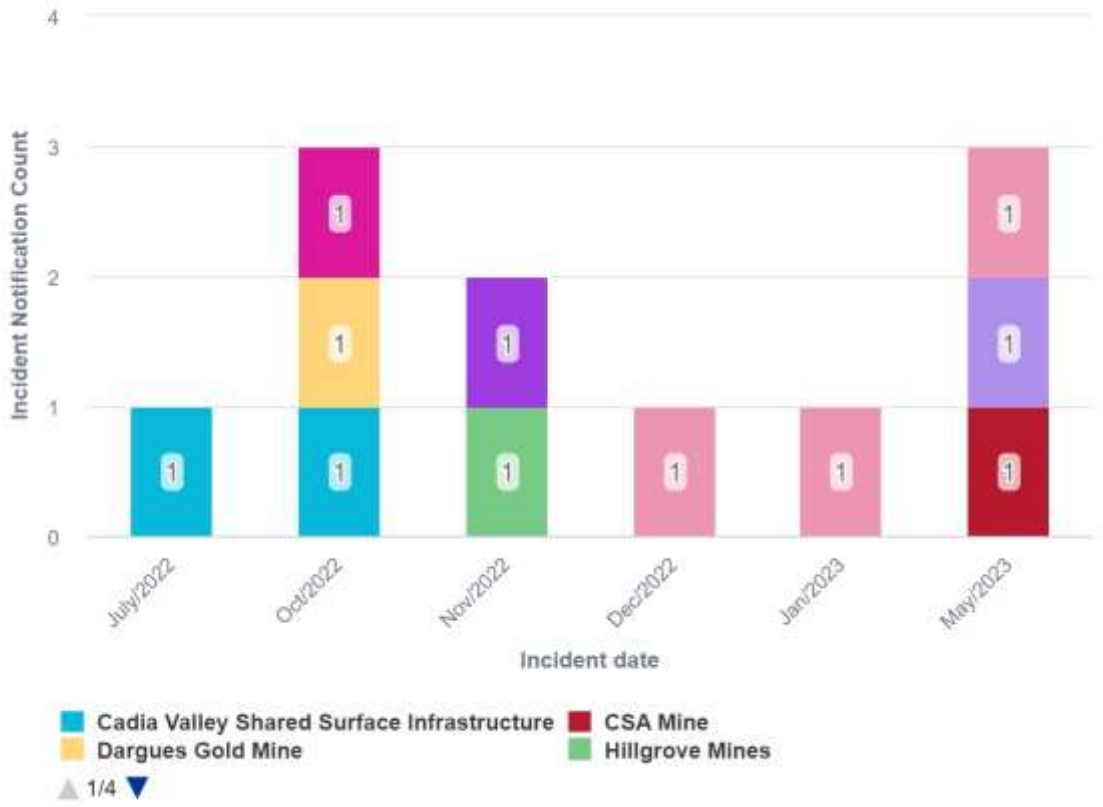
August 2023

Incidents notified

All electric shocks - Metex – July 2022 to June 2023

Total number of electric shocks - 11

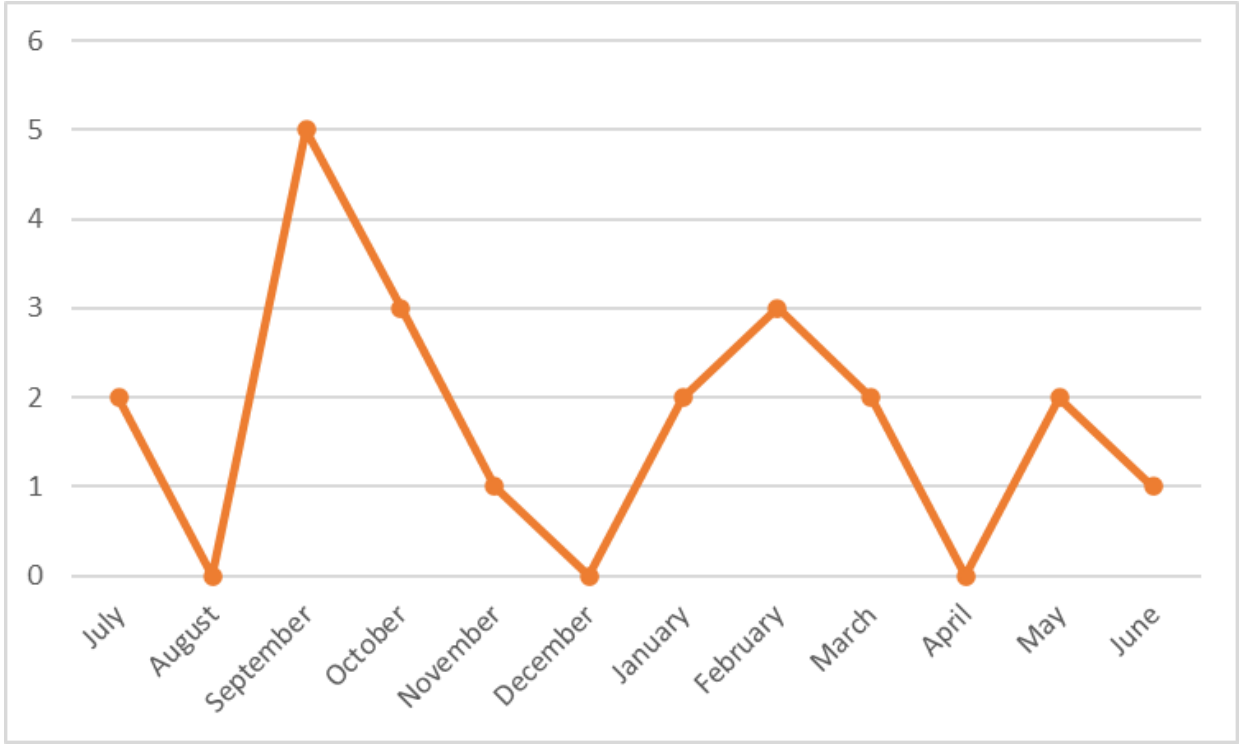
- Processing – 2
- Underground – 9



Fires – Electrical causations – All METEX – July 2022 to June 2023

Total Fires – 21

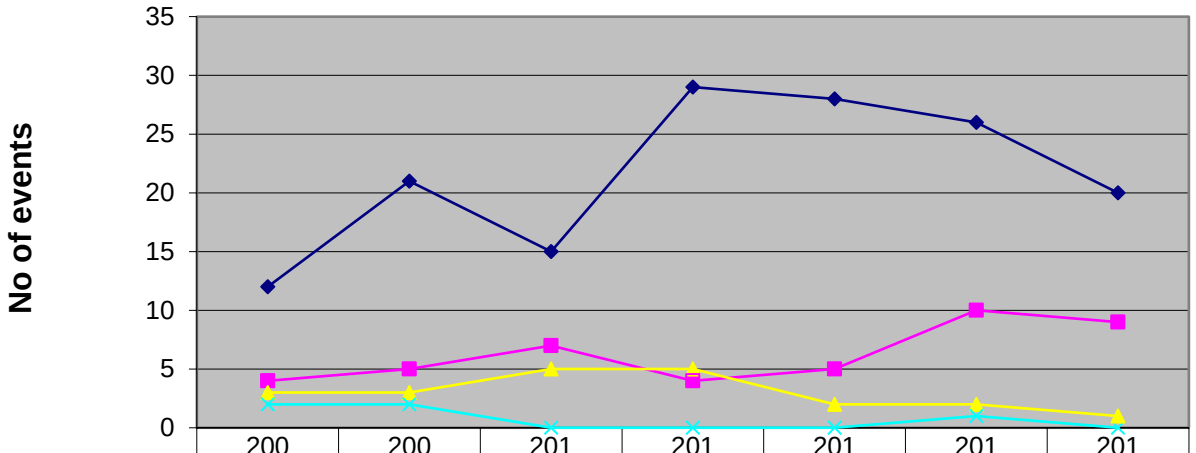
- Surface – 6
- U/G - 15



Electrical incidents in non-coal – 2008 to 2015

2023

- Electric shocks – 11
- Fires – 21



	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Electric shock	12	21	15	29	28	26	20
Uncontrolled explosion or fire	4	5	7	4	5	10	9
Contact with energised high voltage source	3	3	5	5	2	2	1
Failure of powered winding system	2	2	0	0	0	1	0

Lithium batteries

Lithium-ion batteries – Safety Bulletins

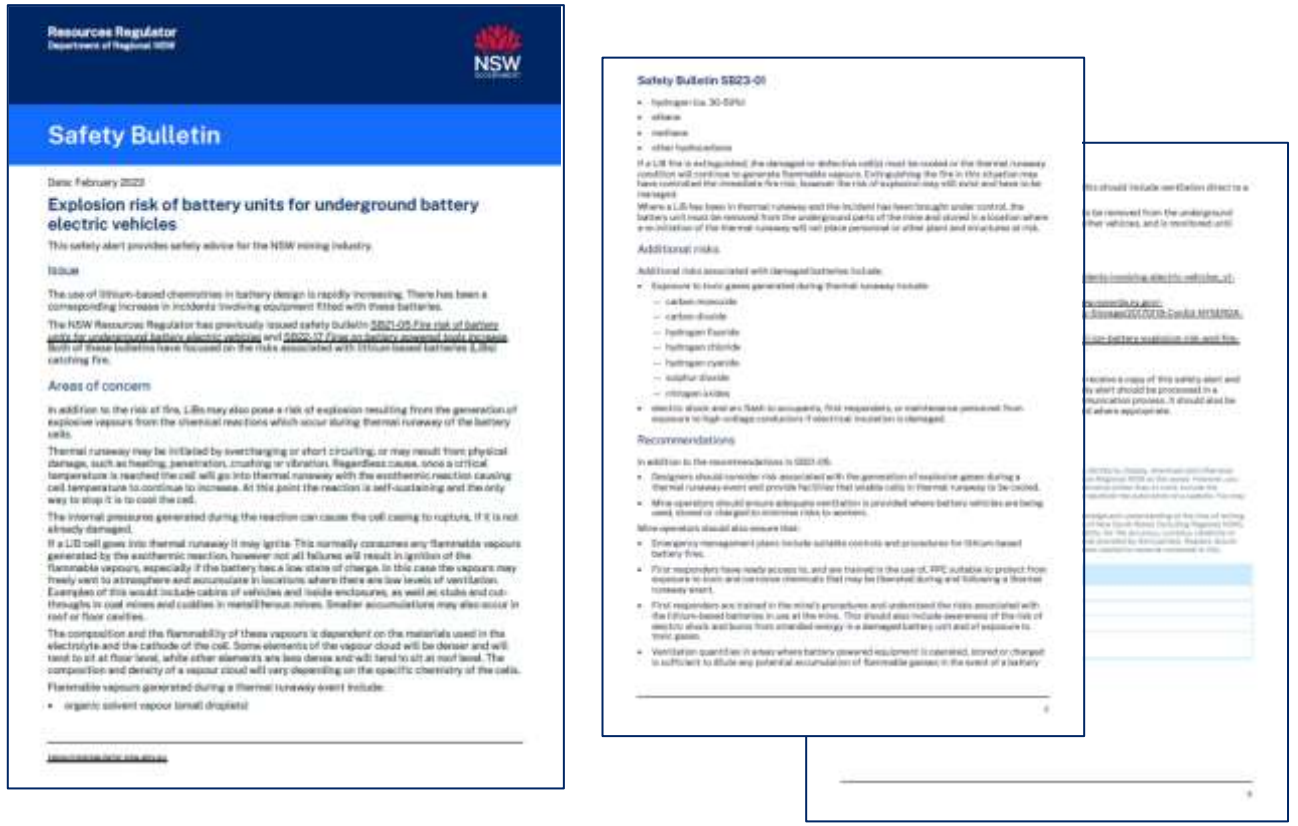
SB21-05 – Fire risk of battery units for underground battery electric vehicles

SB22-17 – Fires on battery powered tools increase

SB23-01 – Explosion risk of battery units for underground battery electric vehicles

Was published on 17/2/2023

Also – EESS2022 – PI presentation


Resources Regulator
Department of Regional NSW

Safety Bulletin

Explosion risk of battery units for underground battery electric vehicles

Areas of concern

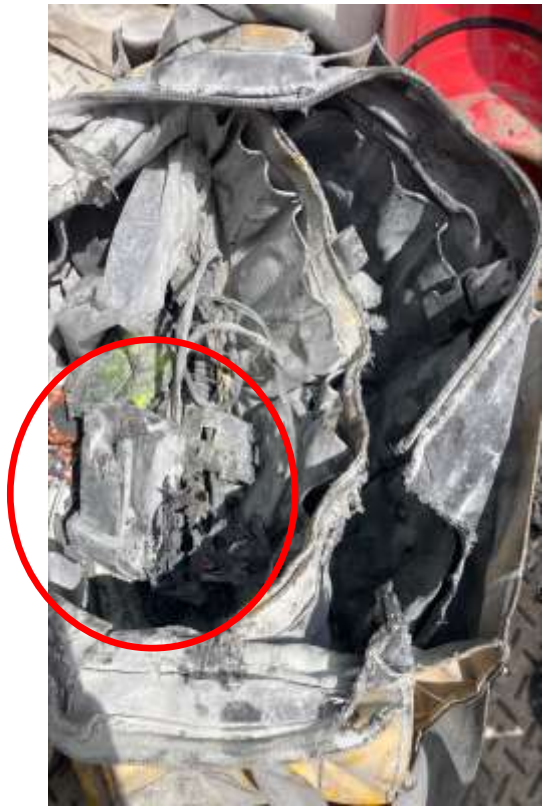
Safety Bulletin SB23-01

Additional risks

Recommendations

Lithium-ion batteries – Safety Bulletin SB22-17 Incident 1

- A lithium-ion battery caught fire whilst being transported in a tool bag in the back of a work utility at an open cut mine. The battery was free to move within the tool bag and was possibly short circuited.



Lithium-ion batteries – Safety Bulletin SB22-17 Incident 2

- A lithium-ion battery caught fire whilst connected to a charger in an underground mine. The fault was identified as being caused by moisture ingress which led to thermal runaway of the battery.

Lithium-ion batteries – Safety Bulletin SB22-17 Incident 3

- A lithium-ion battery was left unattended on the back seat of a utility. The inside temperature of the vehicle exceeded the maximum recommended temperature for the battery and resulted in the battery catching fire.

Lithium-ion batteries – Safety Bulletin SB22-17 Incident 4

- A lithium-ion battery caught fire when run over after falling out of a man basket in an underground mine.

Lithium-ion batteries – Safety Bulletin SB22-17 Recommendations

- Only use charging equipment recommended by the manufacturer for that particular battery.
- Ensure that transporting of spare batteries does not expose them to risk of physical damage or short circuit of the connecting pins.
- Do not expose batteries to water as this can cause a short circuit between the battery connections.
- Do not expose batteries to temperatures greater than 50°C, or as recommended by the manufacturer. It should be noted that temperatures inside a vehicle can be much greater than external ambient temperatures. For example, the internal temperature of a vehicle left with windows up with an ambient temperature of 35°C can reach 60°C in 60mins. The temperature in an open cut mine in full sun can be up to 10°C higher than surface temperatures. These factors need to be considered when transporting and storing batteries in vehicles regardless of whether they are attached to a tool.
- Follow manufacturers safety instructions.
- Have systems in place for managing the use of lithium-ion batteries including tracking of where batteries are being used and who is in control of the batteries, pre-use inspections, regular maintenance inspections, and training of personnel in how to respond in event of emergencies.

SB21-05 and SB22-17 – Fire risk

Overcharging

Results in most ferocious fires

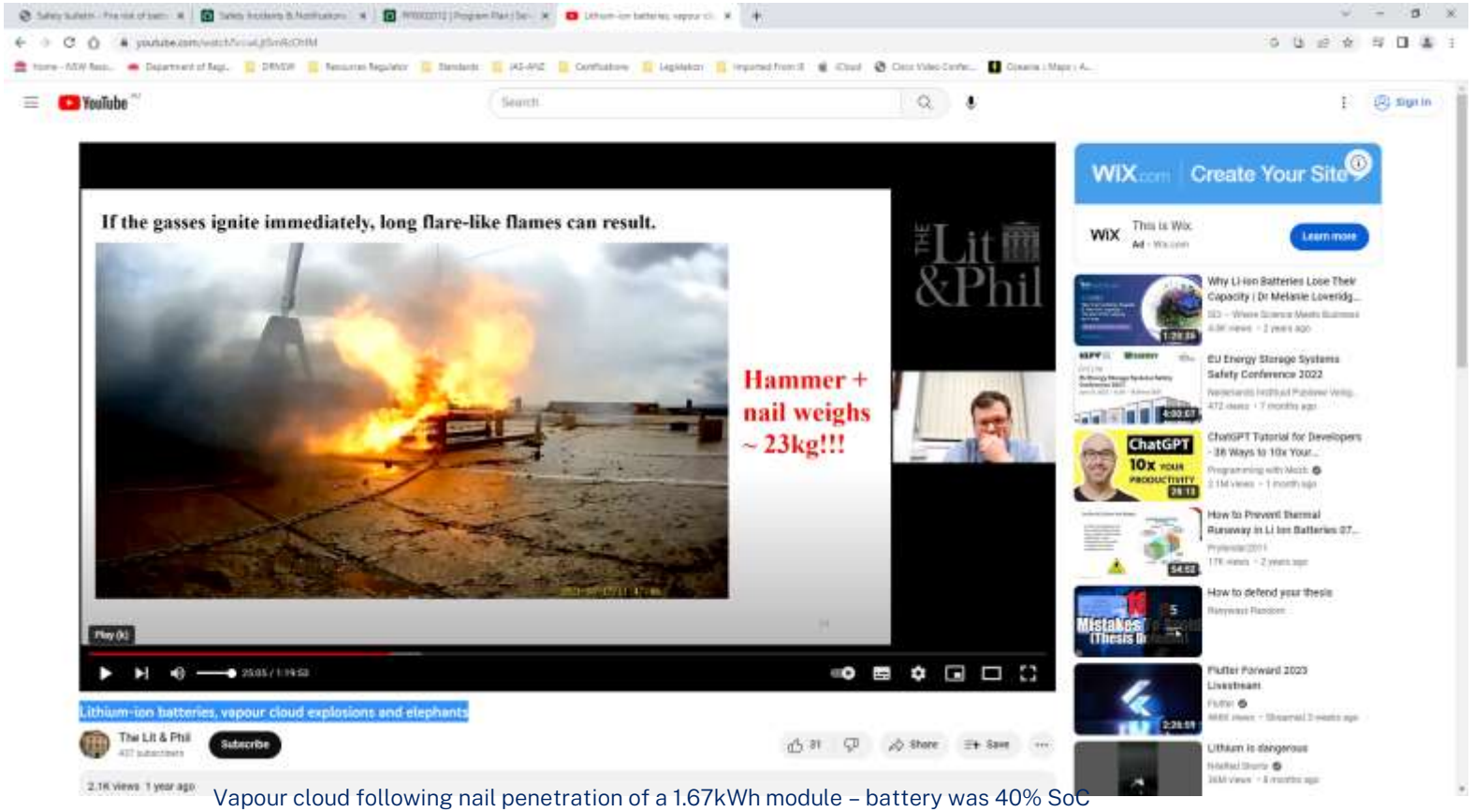
External heat sources

Physical abuse or damage

Excessive vibration

Overcurrent faults & bad connections

Defective cell manufacture



Vapour cloud following nail penetration of a 1.67kWh module – battery was 40% SoC

YouTube presentation by Professor Paul Christensen : Lithium-ion batteries, vapour cloud explosions and elephants
https://www.youtube.com/watch?v=wLjt5mRcOHM

SB23-01 – Explosion risk

Increased risk with batteries with low state of charge (SoC)

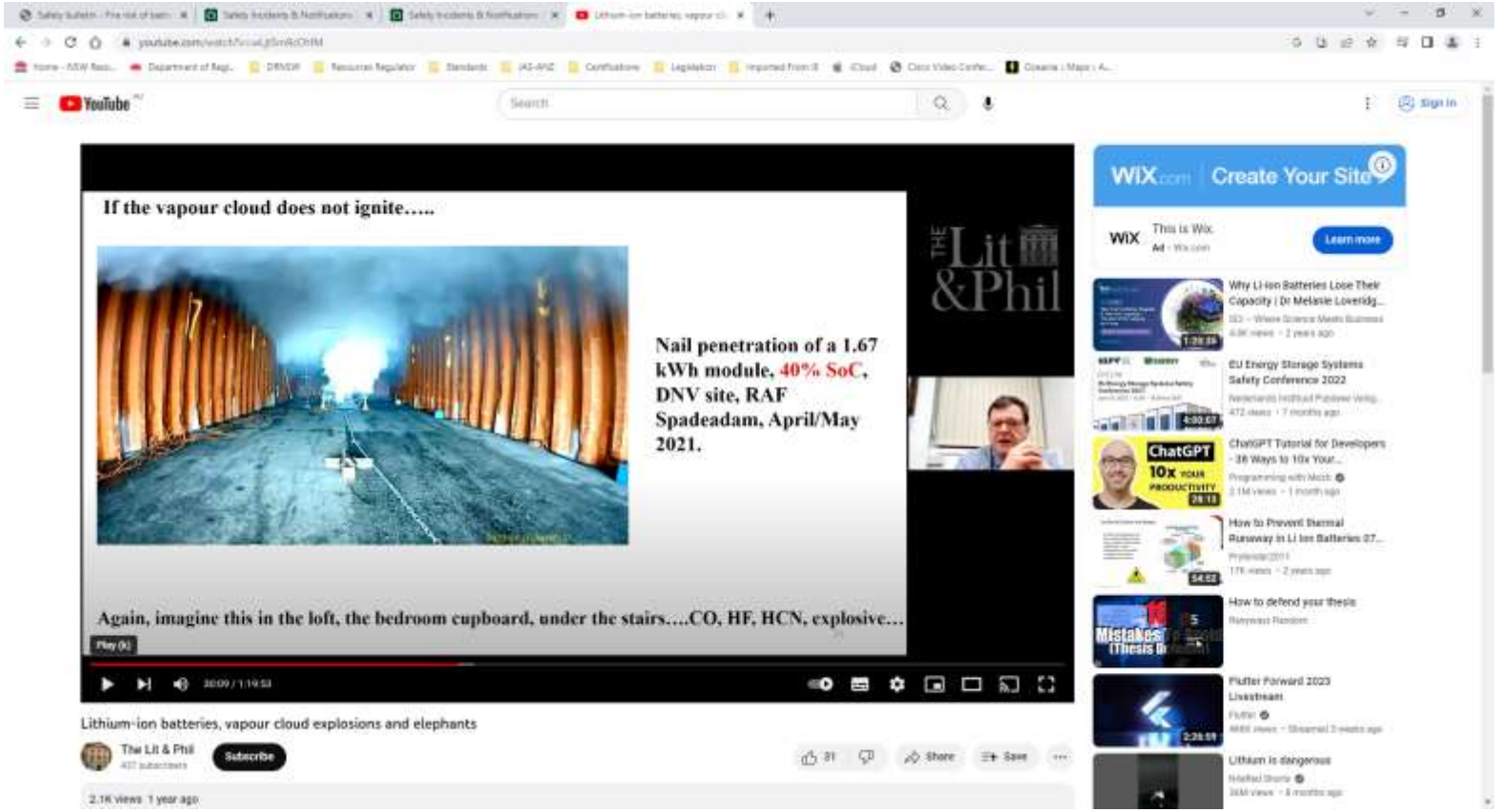
Battery fire extinguished but cells still in thermal runaway

Effects amplified in enclosed areas or areas of low ventilation

Also includes risks from:

Toxic fumes

Stranded energy



Vapour cloud following nail penetration of a 1.67kWh module – battery was 40% SoC

YouTube presentation by Professor Paul Christensen : Lithium-ion batteries, vapour cloud explosions and elephants
https://www.youtube.com/watch?v=wLjt5mRcOHM

If the gasses ignite immediately, long flare-like flames can result.

Hammer + nail weighs ~ 23kg!!!

24

THE Lit & Phil

Other applications

Battery energy storage systems (BESS)

- Solar systems
- Wind farms
- Peak demand management
- Emergency power supplies
- **Ventilation support**
- **Pumping**

Tesla battery at Hornsdale Power Reserve

https://electrek.co/2018/01/14/teslas-massive-battery-in-australia-was-paid-up-to-1000-mwh-to-charge-itself/

Control measures

Consultation with the equipment supplier/designer is essential to understand risks identified and controlled

Mine to have systems in place to manage:

- introduction to site,
- operation,
- maintenance,
- decommissioning,
- emergency management
- Workers trained in risks and required control measures
- Includes first responders

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METEX group programme update

Russell Wood – Principal Inspector Metalliferous
NSW Resources Regulator

August 2023

1

Electrical Engineering Control Plan

Statutory Electrical Engineering supervision

Key issues around statutory functions

1.The mines nominated Statutory Electrical Engineer was on holidays in Europe at the time of the assessment.

2. No replacement Statutory Electrical Engineer has been nominated for the mine.

3. The site Electrical personnel filling in for the nominated Statutory Electrical Engineer does not currently meet the requirement for nomination to fulfil the statutory role.

Welding Equipment

Description

1. Welder earth clamp braids damaged and frayed.
2. Frayed and damaged earth leads.
3. Welders left energised when unattended.

Bypassing of electrical protection

The Secondary Crusher Metal Detector reset button was observed bypassed with the use of zip ties and a Nylock nut.

Discussions with the Secondary Plant operator highlighted that workers had bypassed the reset switch to save them having to leave the control room to reset the magnet. Reportedly this had been done in response to nuisance tripping of the magnet.

Isolation practices for reeling and trailing cables

Discussions with Jumbo operators highlighted that workers are splitting 1000V back-to-back couplers without isolating the cables. The operators interviewed indicated that they would only press the stop button at the Jumbo starter and would not normally apply locks prior to splitting a back-to-back.

The mines Electrical Engineering Control Plan (EECP) Section 14.6 requires that "All electrical isolations shall include the application of personal locks."

2

Structural Integrity

What we found at mine sites

- Instructed by Corporate to complete structural inspections every five years based on commercial need.
- Unfamiliar with legislation regarding inspection of structures.
- No consistency in interpreting the meaning of a competent person.
- Structural reports were out of date and did not include a priority of repair list.
- Support foundations had been excluded from inspection work scopes due to not removing spillage and build up of fines to expose them.
- There was a common theme that it was okay to replace beams and columns as like for like.
- Many repairs were completed by non structural qualified trades.
- Repairs were not often engineered designed or signed off by a competent person on completion.

Work Health and Safety Regulation 2017

213 Maintenance and inspection of plant

The person with management or control of plant at a workplace must ensure that the maintenance, inspection and, if necessary, testing of the plant is carried out by a competent person.

Frequency of inspections was to be at the direction of the manufacturer, or

If not available then at the recommendation of a competent person. or Annually.

What we found in the field

AD-HOC repairs without engineered design.

Heavily Corroded walkway hand rail mountings.

What we found in the field

Examples of lack surface corrosion protection

3

Ventilation

Ventilation

- In mines with cool conditions there is a lack of training in monitoring of temperature and training for supervisor in the use and application of Kestrels
- In mines with warmer conditions there is good training with regards to Kestrels and Thermal work limits (TWL) and management of temperatures with regular temperature readings.
- In most mines there has been poor training of supervisors and monitoring of volumetric air flows in secondary ventilation districts to manage dust, DPM and other airborne containments.
- All mines are struggling to provide adequate volumetric flows to decline and development levels without return airways established.

Ventilation

- Most mines there has been poor verification of secondary ventilation circuits by ventilation engineers to record the equipment operating in the area versus the air volumes being delivered to work areas.
- In most mines there has been poor verification of design in the sites vent sim models, by taking measurements in the work place to calibrate the vent sim models.
- Vent sim models have generally been too aggressive in the mining rates that the vent will support.
- Most mines have a well document ventilation control plan and ventilation standards, however the compliance to the plan and standards was average to poor.

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Emergency Management(EM)

Metalliferous Industry Safety and Health Engagement Forum (MISHEF)- Day 2 Proposal_EM

Justin Allan
Manager Emergency Planning and Response Capability

August 2023

Proposed Scope

- Based on feedback from various Mine Sites during recent Inspections.
- Aimed at Mine Managers, HSE Superintendents, ERT/ ESO and OFA Leaders.
- Resource Regulator Update.
- Industry around the Grounds.
- External presentations from: Emergency Services, REMO/ LEMO and relevant industry/ external representatives.
- Workshop different PPE, Equipment, techniques, Incident Management strategies across industry,
- Focus on Lessons Learned and engagement and improvement.

We need your Feedback

- If you are interested Contact:

- Manager Emergency Planning and Response Capability
- Justin Allan
- **M** 0474 570 374 | **E** justin.allan@regional.nsw.gov.au

Resources Regulator
Department of Regional NSW

NSW Resources Regulator website

Thank You

Justin Allan
Manager
Emergency Planning and Response Capability

NSW Resources Regulator | Department of Regional NSW
M 0474 570 374 | **E** justin.allan@regional.nsw.gov.au
516 High Street | Maitland NSW 2320
www.resourcesregulator.nsw.gov.au

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Any Questions

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Exploration rig management

Petroleum Inspector – Alex Whiteside

NSW Resources Regulator

August 2023

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Line Supervision

Optimising your most important control

MISHEF

Xavier Hill

23rd August 2023

Inadequate Task Supervision

Recommendation 4: The industry needs to focus on ensuring workers are appropriately supervised for the tasks they are undertaking.

In 32 of the 47 fatalities, the worker was required to be supervised when undertaking the task, i.e., the 32 did not include routine tasks, such as driving. 25 of these 32 fatalities involved inadequate or absent supervision.

17 of the fatalities involved a lack of training or inadequate training for the specific task being undertaken and inadequate or absent supervision.

Not only does absent or inadequate supervision allow tasks to be approached in an unsafe manner, but it also greatly amplifies the consequences of a lack of training or ineffective or unenforced controls.

" Not only does absent or inadequate supervision allow tasks to be approached in an unsafe manner, but it also greatly amplifies the consequences of a lack of training or ineffective or unenforced controls."

Training supervisors is regarded as a key issue in accident prevention – WA Fatality Review

The WA Fatality Review also highlighted major deficiencies in supervision. From analysis of the 52 fatalities which occurred during this time period, it was found that '44 per cent of fatal accidents occur under the supervision of a person in their first year in the role, with 6 per cent in the first month'[43].

The WA Fatality Review further found that almost 'a quarter of fatalities involved a supervisor in their second and third year in the role' and overall '68 per cent of fatalities occurred during the supervisor's first three years in the role'[44]. The WA Fatality Review recommended in its Areas for Improvement that the 'training of supervisors is regarded as a key issue in accident prevention'[45].

The WA Fatality Review concluded that this data 'shows that new and inexperienced workers are at particular risk' and required 'close supervision' and adequate safety training[46].

- Just 11% of fatalities occurred when worker WAS following procedure

What does the legislation say?

Primary Duty of Care – *Work Health and Safety Act 2011 (section 19)*

A PCBU (mine operator) must ensure, so far as is reasonably practicable …

(3) (f) the provision of any information, training, instruction or supervision that is necessary to protect all persons from risks to their health and safety arising from work carried out as part of the conduct of the business or undertaking, and

What does the legislation say?

Content of safety management system - *Work Health (Mines and Petroleum Sites)Regulation 2022, clause 19*

The safety management system (SMS) document for a mine or petroleum site must set out the following …

(1) (d) (iv) the positions within the management structure that have responsibility for the management of work health and safety at the mine or petroleum site (including mining supervisors) and the names of the relevant persons,

(k) the arrangements in place for the supervision needed to protect workers and other persons at the mine or petroleum site from risks to their health and safety from work carried out at the mine or petroleum site,

What does the legislation say?

Maintenance of an existing control- *Work Health Regulation 2017, clause 37*

A duty holder who implements a control measure to eliminate or minimise risks to health and safety must ensure that the control measure is, and is maintained so that it remains, effective

Supervision integrity

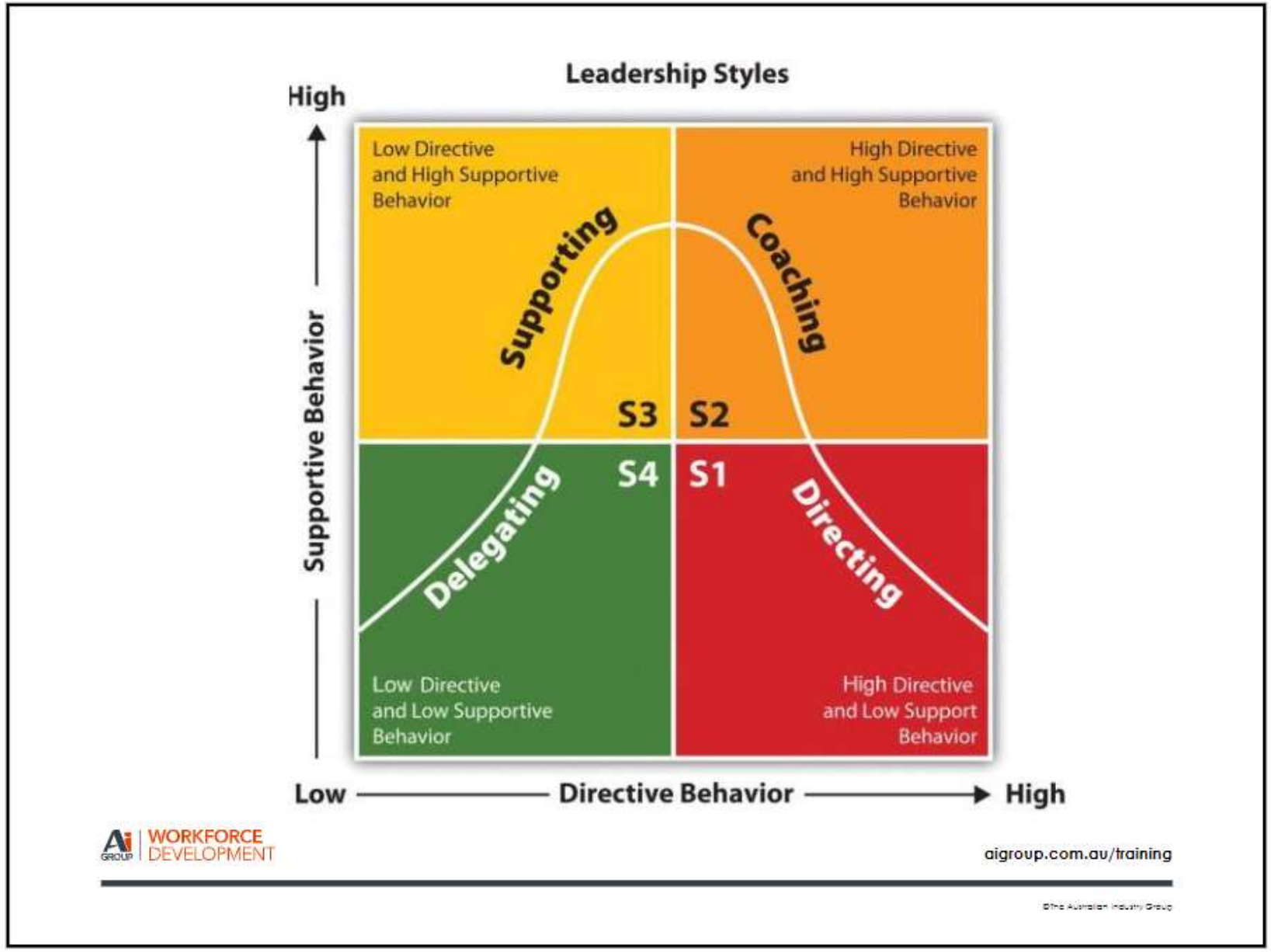
This guide has been endorsed by the Mining and Petroleum Competence Board and approved by the Department of Industry as a guide for examining ANTS for certificates of competence, for example those appropriate for consultation.

Examination panels will refer to the ANTS competencies matrix below as a guide when assessing ANTS for certificates of competence. This may include questions being developed for the oral examination based on the competencies listed for the type of certificate of competence, possibly referring to scenarios.

The table is based on the learning outcomes of the ANTS Action Learning Program for supervisors developed by the department.

Category	LEVEL 1 Sound/Competent		LEVEL 2 Adept/Capable	LEVEL 3 Advanced/Expert		
Mines other than coal	**Underground supervisor**		**Quarry manager – restricted (production manager Permit)**	**Mining engineering manager – Underground, Electrical engineer (> 1000 kW or high voltage)**		**Quarry manager**
Coal mines	**Open cut examiner**	**Deputy**	**Undermanager**	**Electrical & mechanical engineer and engineering manager**	**Mining engineering manager - underground**	**Mining engineering manager – other than underground**
Key stakeholder engagement	Within area of responsibility with workers, middle managers / supervisors, contract workers		Within area of responsibility with workers, supervisors, senior managers, contractors on site and government officials on site	Whole of mine approach and outside the mine with corporate entities, contracting companies, communities, union officials and government agencies		
Leadership	The candidate will demonstrate: • using authority and influence to implement the plan for the work group • maintaining standards in their area of responsibility • planning and prioritising work within their work group		The candidate will demonstrate Level 1 abilities and; • using authority and influence to implement the shift plan • implementing and maintaining standards in their area of responsibility • planning and prioritising work across the mine site	The candidate will demonstrate Level 1 and 2 abilities and; • using authority and influence to implement the mine safety management system, both for internal and external stakeholders • establishing standards across the mine • planning and prioritising work across the mine area under their control • managing workload and resources		
Decision making	The candidate will demonstrate: • a systematic risk based approach to decision making • an understanding of their level of authority		The candidate will demonstrate Level 1 abilities and: • using a variety of systematic risk based decision making processes • understanding their level of authority	The candidate will demonstrate Level 1 and 2 abilities and: • establishing a decision making framework for others • understanding their level of authority		
Team work	The candidate will demonstrate: • exchanging information to safely		The candidate will demonstrate Level 1 abilities and;	The candidate will demonstrate Level 1 and 2 abilities and;		

Category	LEVEL 1	LEVEL 2	LEVEL 3
	complete the work plan • coordinating activities to achieve the work plan • supporting others to ensure that they are working in a safe and productive manner • their ability to resolve conflict in their team	• exchanging information to safely complete the shift plan • coordinating activities to achieve the shift plan	• providing support to the management team that promotes a team culture
Communication	The candidate will demonstrate: • effective communication with team members that ensures comprehension by both parties of the tasks, hazards and controls • ability to ensure shared understanding of tasks and the hazards associated with the work environment • how to communicate the work plan • listening skills • two way dialogue for understanding/comprehension	The candidate will demonstrate Level 1 abilities and • communicating the work plan across multiple work groups	The candidate will demonstrate Level 1 and 2 abilities and • communicating complex message to multiple groups & levels • communication: planning message to ensure: o message understood, and o across all groups • identify and address barriers to communication
Situation Awareness	The candidate will demonstrate: • understanding of changing work environment and the need to adjust work plan as required • using and being able to gather information that enables them to make decisions based on risk within the work group environment, from the following sources: o workers o monitors/gauges o visual assessment • focusing on the here & now, with up to a 24 – 48 hours timeframe eg. airborne contaminants	The candidate will demonstrate Level 1 abilities and • the ability to understand their own situation and the situation assessment by others • assessing the here & now but with projection into the near future, with a week to 2 weeks out timeframe eg. airborne contaminants	The candidate will demonstrate Level 1 and 2 abilities and • retaining an overview of the entire mine drawn from multiple sources on a daily basis • gathering information for impact over 12 months to 5 year focus 'long term' eg. need for air management plan and strategy • reviewing information


Leadership Styles
High
Supportive Behavior
Low Directive and High Supportive Behavior
High Directive and High Supportive Behavior
Supporting
Coaching
S3
S2
S4
S1
Delegating
Directing
Low Directive and Low Supportive Behavior
High Directive and Low Support Behavior
Low
Directive Behavior
High
WORKFORCE DEVELOPMENT
aigroup.com.au/training

How do you select supervisors?

- Proven performance?
- Length of service?
- Working association?
- Friend/buddy?
- Last person standing?

Were you looking for the characteristics we have listed?

Have you explained the duties of the role?

- Role description?
- Does it include expectations?
- Does it include WHS obligations?
- Have you discussed the standards that you expect?
- When was the role description last reviewed?
- Have you discussed the supervisors performance?

Supervisor Training

Why may a supervisor allow unsafe acts?

- Lazy
- Fear their job will become harder (more work required)
- Pressure from mine operator
- Unsure of authority – level of empowerment
- Assume it is someone else's duty
- Conflict of interest (family & friends)

At your operations

The majority of process and personal incidents, injuries and accidents are caused by unsafe acts and behaviours, **not** conditions and equipment ?

Involving Supervisors

Are supervisors familiar with:

- Safety Management System
- PHMP
- PCP
- Procedures
- Australian Standards
- **Safe Act Observations**

Where to from here

Require all **managers** and **supervisors** to draw a personal line in the sand of what they will accept.

It is a journey that does not end

Will not happen without leadership

Focus on ‘unsafe acts’

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Questions

Image caption here

KSN KINGSTON RESOURCES LIMITED

Development of the Mineral Hill SMS

MICHEF – Dubbo

August 2023

Geoff Merrell, General Manager Mineral Hill

ASX: KSN

Important Notices and Disclaimer

Forward looking statements: Certain statements contained in this presentation, including information as to the future financial or operating performance of KSN and its projects, are forward looking statements. Such forward looking statements:

include, among other things, statements regarding incomplete and uncertain proposals or targets, production and prices, operating costs and results, capital expenditures, and are or may be based on assumptions and estimates related to future technical, economic, market, political, social and other conditions;

are necessarily based upon a number of estimates and assumptions that, while considered reasonable by KSN, are inherently subject to significant technical, business, economic, competitive, political and social uncertainties and contingencies; and

involve known and unknown risks and uncertainties that could cause actual events or results to differ materially from estimated or anticipated events or results reflected in such forward looking statements.

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For further information on the Life of Mine at Mineral Hill referred to in this Presentation, refer to the Company’s ASX Announcement dated 27 June 2023, $6.5m Capital Raising or Mineral Hill Production Expansion.

Exploration by Other Explorers

This presentation contains information sourced from the reports of Other Explorers. References to the original reports are provided as footnotes where the information is cited in this presentation. KSN does not vouch for the accuracy of these reports. KSN has taken the decision to include this information as it is in the public domain and as we assess it to be of relevance to shareholders and investors.

Mineral Hill Overview

Mineral Hill a “storied” recent history

Legacy that is helpful and less so.

- Mineral Hill has always been a small site, with a need to make do
  - That said, it is quite capable of generating good cash.
- The bulk of the infrastructure dates to 1988 with variable levels of update in 2011, 2015 and 2021

- It all came apart in 2016 giving us the inheritance that we are working with.

Mineral Hill 2016 and onwards

The Inheritance

- The Good
  - There was a plant
  - There were TSFs
  - There is ore in the ground

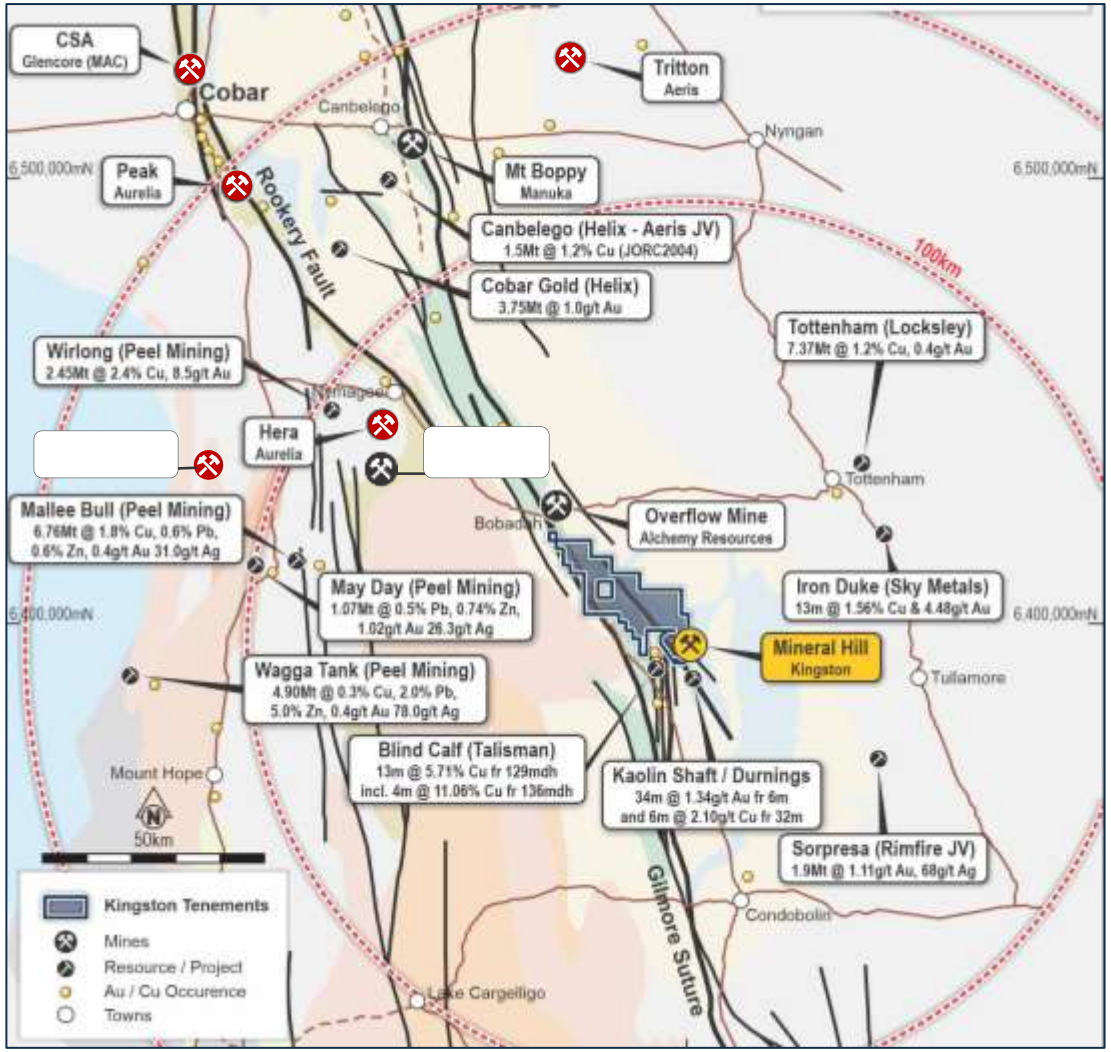
- The Bad
  - Workforce scattered to the winds
  - Everything needed a birthday
  - The site never transitioned to a modern SMS
  - Minimal Care and Maintenance with only the very basics

- The Ugly
  - The place had gone broke.
  - The new owners didn’t want to be miners

- So why did we persist?

Mineral Hill – strategic location

Significant organic and regional resource growth opportunities



Abundance of gold-silver and polymetallic Cobar-style deposits within approved ML's and within trucking distance of Mineral Hill processing plant

Location	516km W of Sydney NSW in Cobar Basin
Ownership	100%: 20 ML's (4.85km^2) and 2 EL's (335km^2)
Reserves (recovered)[1,2]	**53,000 AuEq oz**
Resources (recovered)[1,2]	**795,000 AuEq oz (40% Cu, 30% Au)**
Orebody	Structure controlled polymetallic vein and epithermal Au
Mining Methods	Open pit and underground long-hole stoping
Water	Supplied from underground and site storage
Power	Mains with grid upgrade
Historical Production	396koz Au, 33kt Cu (plus Pb, Zn concentrate)

1. Gold equivalent ounces calculated based on consensus commodity prices with adjustments based on company expectations. See Appendix for equivalency calculations
2. See KSN ASX announcements on 18 November 2021, 24 November 2022, 15 March 2023, 21 March 2023 for additional Mineral Hill Resource and Reserve information.

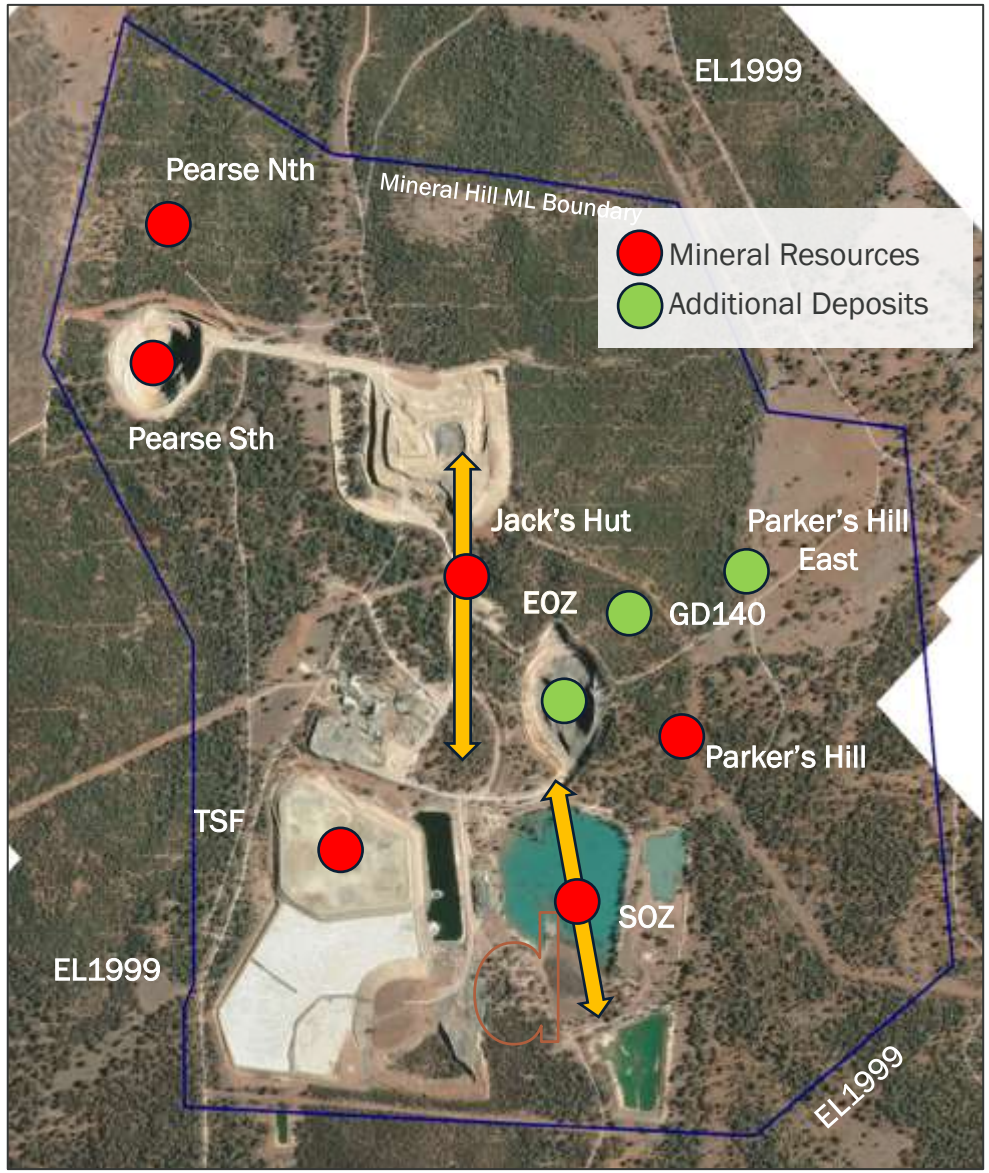
Mineral Hill – mining lease and infrastructure

Extensive existing infrastructure enables accelerated path to gold-silver doré, copper, lead and zinc production

- Numerous Cobar style mineral deposits all within approved mining leases.
- Quick cash flow from reprocessing historical tailings, owner miner.
- Full mine approvals, environmental permits & biodiversity offset, tailings facilities, water and power all in place.

Processing Infrastructure

- **CIL** with 700ktpa capacity.
- **Flotation plant** capacity of 350ktpa.
- The back end of the Plant was in relatively good condition,



Mineral Hill Restarting the site

Reprocessing Tails to fund the journey

- Restart feaseability in 2019
- Remember we had an owner with no apatite to spend…

- We did have 1.8Mt of 1.13Au ore already nicely crushed up
- An essentially brand-new CIL

- And…
  - A novel way to reclaim tailings
    - That didn’t come with someone else’s risk management protocols

  - So, what does that look like…?

Mineral Hill Restarting the site

Reprocessing Tails to fund the journey

New Century

Mineral Hill

Mineral Hill Restarting the site

Transition from Construction to Mining

- Construction activities covered under SWMS etc just to get rolling
- Elec Engineer on board by June 2020
- BBRA July 20
- HRA for TSF works Aug 20
- CIL Hazop Sep 20
- GHD for all things TSF

Mineral Hill SMS backbone

PCP/PHMPs in play

- Inundation and inrush
- Fire and Explosion
- Air Quality
- ROVOA
- Ground and Strata

- Elec Engineering
- Health
- Emergency Mgt
- Mech Eng

- Each one driven from the BBRA and then site RAs with competent people and worker input

Mineral Hill SMS backbone

Keeping it fresh and making it real

- Change is as good as…
  - New area/activity BBRAs
  - Audit to address FFP and legislation update (Oct 22)

- Keep it fresh
  - These were the best we could do when we started
  - We know so much more now

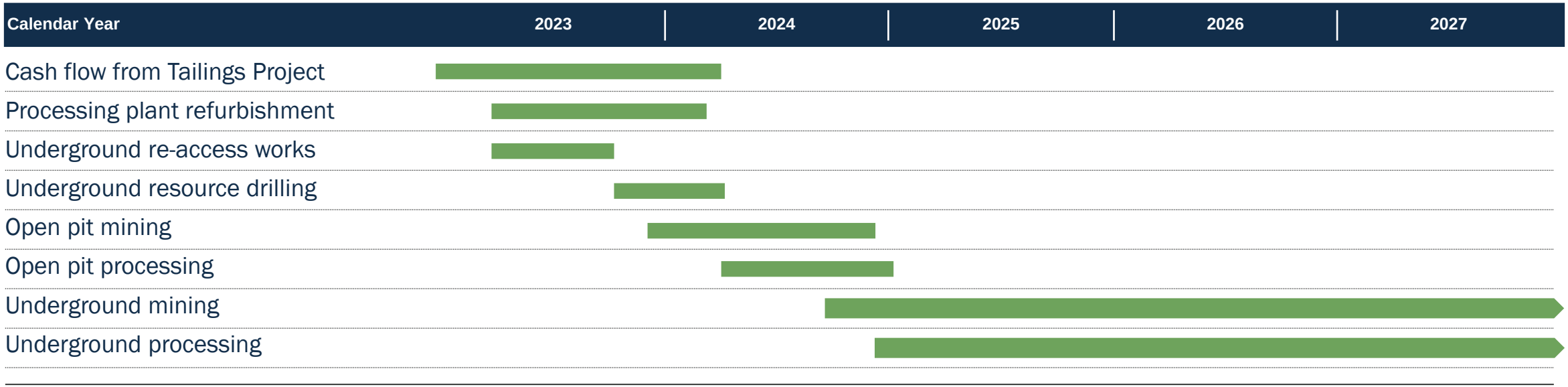
- Get them off the shelf
  - TARP it
  - Toolbox it

- Give them an owner and the Resources

- Stay on top of the new-to-mining personnel

Mineral Hill – Supporting a LOM plan

Yup, we are going to be busy…



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Audiometric Testing

Update on the exemption of audiometric testing

MISHEF

Karen Tripp – SMSO Occupational Hygienist

23rd August 2023

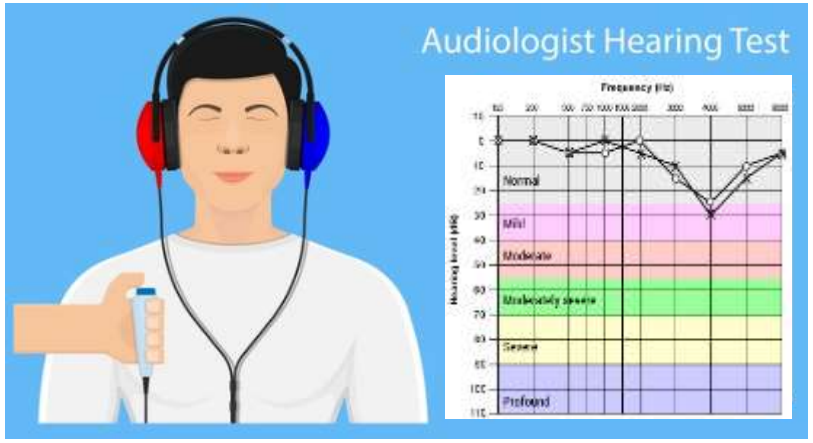
Exemption Changes

- Previously there was an exemption granted under the WHS 2017 Regulation for Audiometric Testing
- The **Exemption to Audiometric testing lapses 1st January 2024**

Conducting Audiometric Testing

- Testing should be undertaken by a competent person (e.g., an audiologist) in accordance with AS/NZS 1269.4:2014.
- The test results are provided to the worker immediately after the test with an explanation of what the results mean.
- List of accredited providers:

  https://audiology.asn.au/Home



Legislative Framework

Clause 58 of the WHS Regulation (2017) states audiometric testing must be provided by a PCBU:

- when a worker is frequently required by the PCBU to wear hearing protection at work as a control measure to protect them from noise related hearing loss from noise that exceeds the noise exposure standard.

  The exposure standard for noise is defined as:

  - an 8-hour equivalent continuous noise level of 85 dB(A), $L_{Aeq,8h}$ 85 dB(A), or
  - a peak sound level of 140 dB(C), $L_{C,peak}$ 140 dB(C)

- within three months of commencement of employment for new workers (*baseline test*), and
- in any event, every two years (*follow-up testing*).
- more frequent testing may be required for workers exposed to high average noise levels during their work shifts (e.g., noise levels greater than 100 dB(A)).

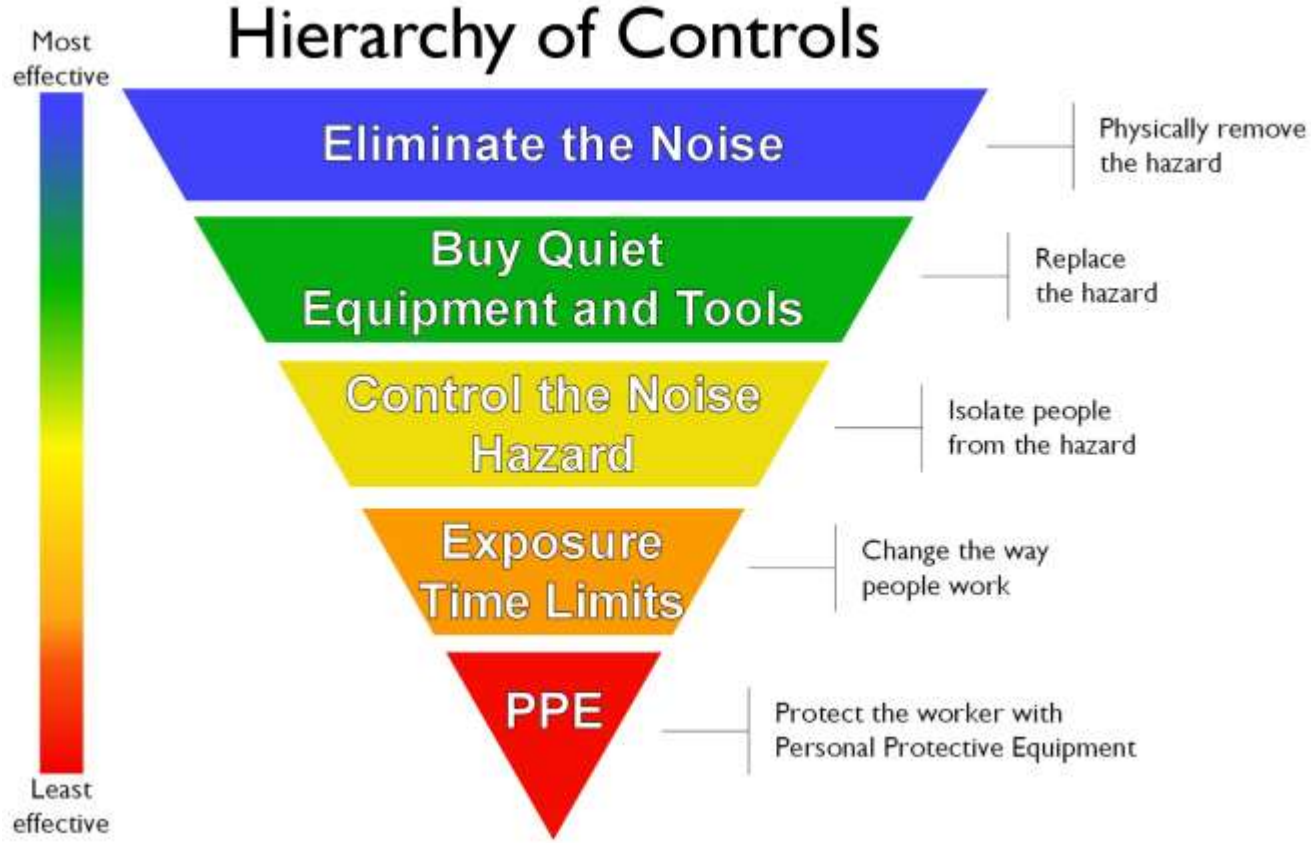
Responsibilities of PCBU's

- provide audiometric testing for workers as per clause 58
- keep confidential records of the baseline and follow-up hearing tests for each worker
- review noise control measures in the workplace if a permanent threshold shift of hearing, or tinnitus is detected for a worker
- take reasonably practicable steps to modify the work environment for workers whose hearing loss interferes with the ability to perform work safely
- provide copies of the worker's hearing tests when their employment ends

Noise Induced Hearing loss

- Can occur acutely or gradually overtime
- Can be made worse by a person's exposure to certain chemicals called ototoxic substances, such as some solvents, heavy metals and asphyxiants.

  These substances can be absorbed into the body and cause damage to parts of the inner ear and auditory nerve.



Control Measures:

- Continue to utilise the hierarchy of controls – WHS R 2017 Cl 36 to mange noise exposure of workers.

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Questions

Image caption here

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Managing equipment interaction through mine design

Chris Georgiou
Tronox

August 2023

Atlas/Campaspe
Improving Safety in Mining

Our Journey to Zero Harm Mining at Atlas

1. Contractor selection at Atlas to improve SQLCST at our new Atlas Mine - a step change was made. Foundational pathway established.

2. Research industry best practice – NSW Resources Regulator conference on Proximity Awareness and Collision Avoidance – Learning: establish solid base of operations and work with truck manufacturers before tackling proximity awareness and collision avoidance i.e., nuisance alarms decreasing safety.

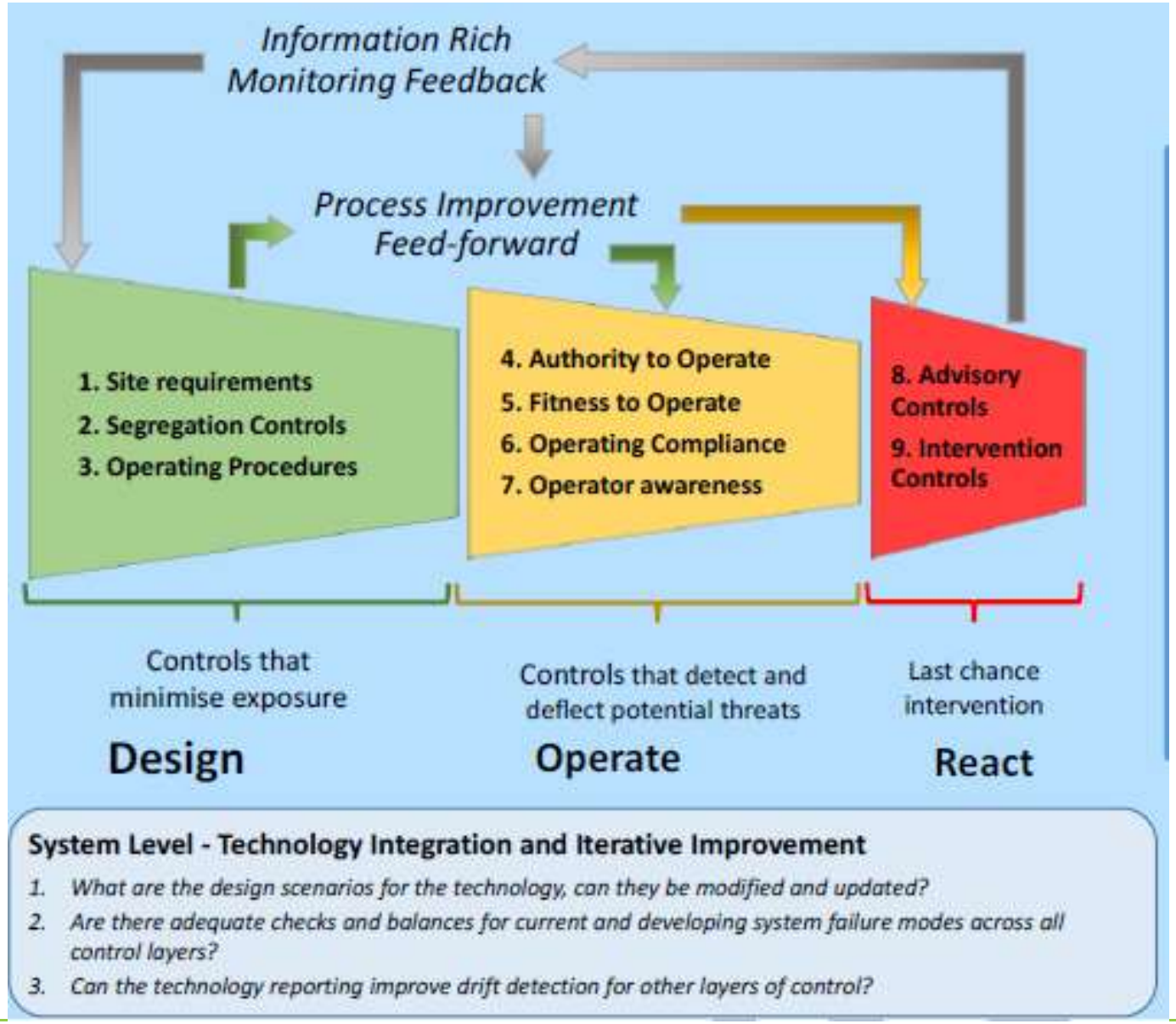
3. EOPS site round table established to tackle our pathway – realization of enormity of task, but we are motivated. Mine design based on hazard control matrix – eliminate in first instance – why cannot we have separate HV LV roads to eliminate interaction?

4. Aligned our project plan with Earth Moving Equipment Safety Round Table (EMESRT) – industry representatives from BHP, Glencore, Rio Tinto – Vision Statement – a mining industry free of fatalities, injuries and occupational illnesses.

5. Commenced our Vehicle Integration Control Effectiveness (VICE) review of our operations based on EMESRT process – of the 92 credible failure modes to create incident 84 existed at Atlas – the 84 were assessed for current controls and gaps – gap analysis and action plan created.

6. Continual improvement. – engaged in industry, open to improvements, best in class audits vs Tronox site standards.

NSW Resources Regulator Conference



Learnings from Conference:

- If you do not embed levels 1 – 7 before 8 & 9 you will create nuisance alarms that decrease safety,
- Successful Industry leaders in applying levels 8 & 9 worked collaboratively with technology and earthmoving machine manufacturers for solutions – example Northparkes,
- Technology needs to interface with equipment system – example Hexagon,
- Most industry leaders were working in silos having the same issues,
- All presentations were referencing EMESRT process.

Levels 1 – 7 set up the operation for success.
Levels 8 & 9 are safeguards that you buy and don't want to use.
We adopted EMESRT process

EMESRT Process - Tronox Mining Vehicle Interaction Control Effectiveness (VICE)

Thirteen Required Operating States

ROS 01 Operator maintains adequate clearances / distances

ROS 02 Vehicle operators give way appropriately to mobile plant and pedestrians

ROS 03 Operators drive vehicles at speeds which meet site rules and local conditions

ROS 04 Operators do not drive vehicles when impaired

ROS 05 Operators park vehicles correctly

ROS 06 Physical barriers provide separation

ROS 07 Alarms alert operators to nearby hazards and operator takes appropriate action

ROS 08 When a Vehicle Component alarms the operator responds appropriately

ROS 09 Loads are appropriate for vehicle type and site conditions, items are secured during travel.

ROS 10 Access Control

ROS 11 Seat belts are used by vehicle operators and occupants

ROS 12 Cabin protection is to site standards

ROS 13 Emergency Responders manage injuries

Five Credible Failure Modes Groups

1. Controller is compromised
2. Equipment is compromised
3. Operating Environment is compromised
4. Interactions between workgroups are compromised
5. System level management is compromised

(92 Credible Failure Modes in Total)

Incident experience cross check – analysis of over 20,000 vehicle interaction incidents. Control Framework Baseline Validation at 35+ Operating Sites

Six Business Input Groups

1. Competent and Situation Aware Pedestrians and Vehicle Operators
2. Fit for Purpose Equipment
3. Operating Environment for mobile equipment
4. Mobile equipment interface management
5. Mobile Equipment Interactions are Optimised at a System Level

(102 Business Inputs in Total)

Example of our results – Atlas and Ginkgo

People - VICE Improvement Opportunities Atlas Mine and Ginkgo Mine

Operators and all people working around mobile equipment are trained, competent, authorized, informed, alert, and situationally aware.

These business inputs focus on ensuring:

- Operators in control of mobile equipment are trained, competent, authorized, and situation aware.
- People who routinely work around mobile equipment are trained, competent, authorised, alert, informed and situationally aware
- People who are visitors to mobile equipment locations are authorised, supervised, alert and situationally aware
- Mobile equipment operational requirements (task assignments) are effectively communicated by supervisors to the workforce
- Mobile equipment operations are monitored and adjusted to remain safe and productive e.g. credible failure modes that can compromise alertness and situational awareness are identified and managed.

Training System Review:

- *Training matrix update (Atlas)*
- *Training alignment with SMS and PHMP*
- *Refresher induction timing*

Review *Fit for Work* Processes:

- *Fatigue including work hours and technology*
- *Alcohol and other drugs*
- *Alignment with Tronox and contractor expectations*

Improve Communications:

- *Updates to Traffic Management Plan*
- *Health and safety consultation*
- *Vehicle features e.g. alarms and sight lines*
- *Road works hazards*

Review performance management processes

- *Supervisor support and capability*
- *Application during transition to production (Atlas)*
- *Application during technology pilots*

Introduce Technology that:

- *Assists operators*
- *Improves performance monitoring*
- *Provides local information*
- *Delivers aggregated performance analysis*

What we did:

- Reviewed 92 credible failure modes – agreed that 84 can occur on our site,
- We reviewed the 84 failure modes as per example. Assessed if we believed our controls are adequate or not,
- At Atlas we came up with 59 actions. 35 are currently completed.

What About Design of Roads and Intersections and Other Vehicle Operating areas

Critical Part of Tender Process (Setting the expectation early)

Researched best practice, and made part of tender process.

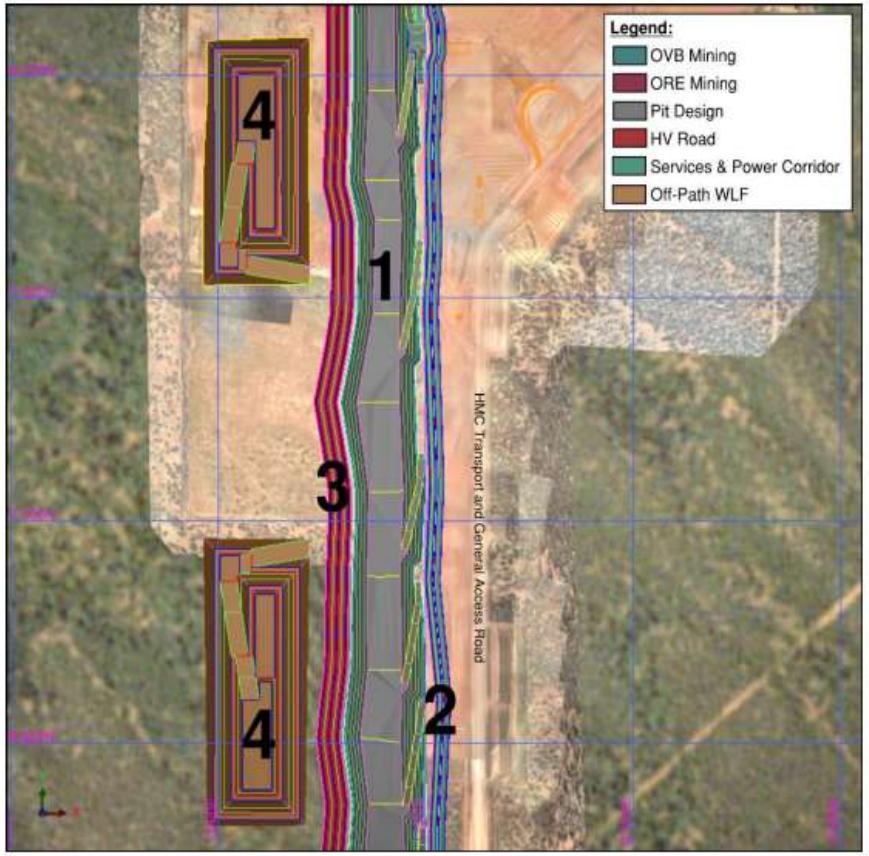
Item	Requirement	Comment
Clay pit batter slope angle	60 degrees	2.00 g/cm^3 density nominal
Sand pit batter slope angle	30 degrees (dry and dewatered)	1.62 g/cm^3 density nominal
Pit edge stand off	5 meters insitu, 10m fill material	
Rehabilitation batter angle	1 in 5 (m) to 1 in 7 (m) as directed by principle.	
Concentrator feed lower limit		
Concentrator feed upper limit		
Concentrator optimal feed		
Concentrator on stream time	94%	
DMU feed	In pit blending targeting average grade distribution of section to plant	
Ore Mining Operations	24 hour – 7 days a week – matching plant feed OST requirements	Ore density
ROM requirements	Minimum 2 hours of plant feed at any one time.	
ROM requirements	Nominal 11 hours of plant feed at any one time – 3300bcm/ 5500t	
Clearing Operations	February to May	
Topsoil Mining Operations	As required – direct placement or stockpile as directed by principle	
Overburden Mining Operations	As required to meet production requirements	Rosters to align with Tronox to maximize camp room utilization
In Pit Tail Cell Wall Construction	Sand material as directed by the principle	
Exposed top of ore	250m or 3 weeks ore feed available at any one time.	
Pit crest storm water drainage	1 in 100 (m) gradient away from pit	
Storm water management	1 in 20-year rainfall event or 72-hour rainfall event	
Off path dumps	20m max height, 1 in 5 (m) batters	
On path over height placement	10m max height, 1 in 7 (m) batters	
Overburden fill	Angle of repose, toe bench required over wet tails or unstable ground conditions.	Rock roll and clay roll to be controlled via catching bunds.
Road design – duel lane corners	4 times largest vehicle	
Road designs - duel lane	3.5 times width of largest vehicle	Center delineation bund required
Road designs – single lane	2 times width of largest vehicle	
Go line design	Personnel vs HV segregation	
Bund heights	2/3 height of largest wheel	
Intersection design	70 – 90 degrees	
Ramps	1 in 10 (m) gradient, width same as haul road design	Location as directed by principle
Speed limit	40 kph Horizontal, 10kph Ramps	
Rehabilitation erosion control	300mm topsoil – minimum 500mm sand overburden – minimum 500mm clay overburden	Upper sequence for rehabilitation profile. Predominately used for erosion control.

Design Sections

Overview:

- Designs:
  - **Design 1:** Revised pit design to include in-cut ramps
  - **Design 2:** Services corridor (East)
  - **Design 3:** HV Haul road (West)
  - **Design 4:** Off-Path WLF design

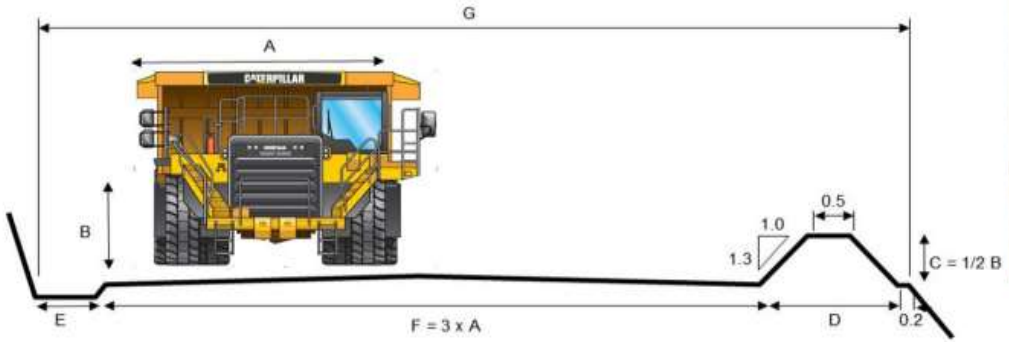
- Initial water management concept requires further work and not included
  - Initial approach using 1:100 slope applied to offset pit design and a blanket fill slope away from the pit to manage water
  - Revision to use contour “Heatmap” approach to identify low spots and potential water flow sources to identify diversion and retention dams



Right Road Right Truck

Type	CAT740 Articulated Dump Trucks
Width (m)	3.43
Tyre	29.5R25
Tyre Diameter (m)	1.822

Straight Single Lane Roadway	2 x Operating Width
Straight Double Lane Roadway	3.5 x Operating Width
Curved Single Lane Roadway	2 x Operating Width x 1.18
Curved Double Lane Roadway	3.5 x Operating Width x 1.18

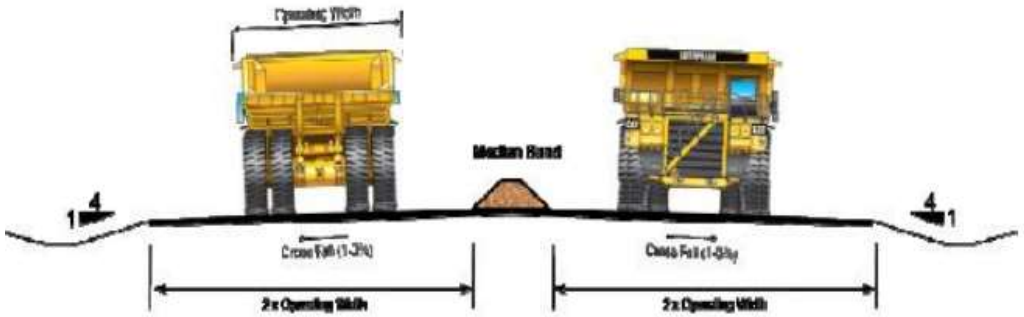


- Ramp designed at 16m wide
- Width based on
  - **0.2m edge offset**
  - **D: 1.7m bund width**
    - 0.91m high bund
    - 0.3m flat on bund
  - **E: 1m drain**
  - **F: 12.8m road width**
    - 3.5 x CAT740 width
    - 0.8m pump width
- Ramp grade 1:8.5 (11.8%)

Right Road Right Truck

Straight Single Lane Roadway	2 x Operating Width
Straight Double Lane Roadway	3.5 x Operating Width
Curved Single Lane Roadway	2 x Operating Width x 1.18
Curved Double Lane Roadway	3.5 x Operating Width x 1.18

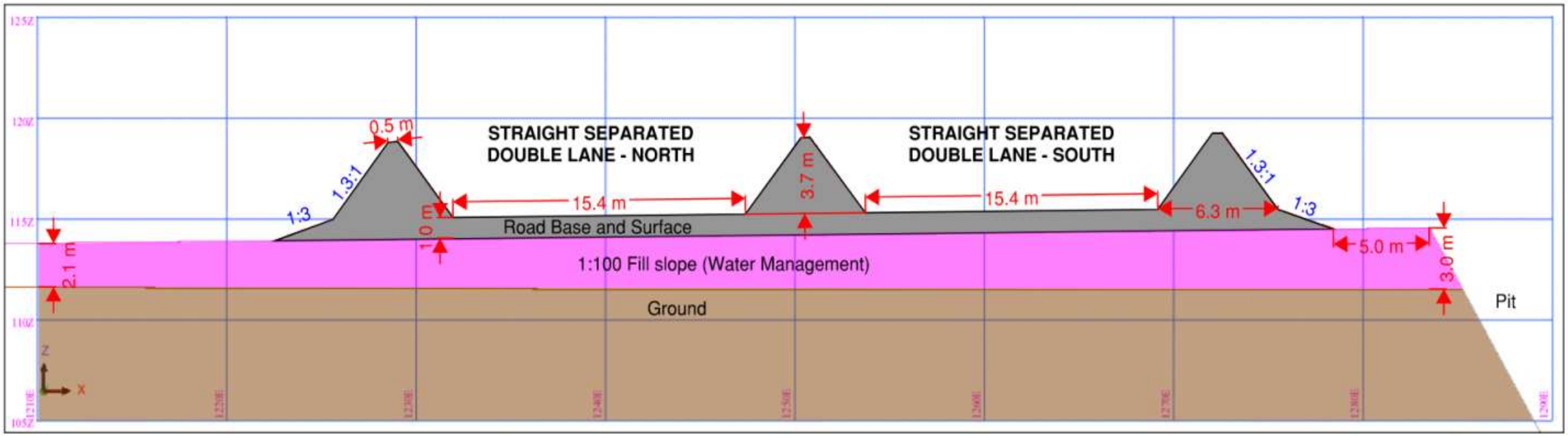
Straight Separated Double Lane Roadway Schematic



- Width based on
  - **Straight separated double lane roadway**
  - **2 x Operating width for CAT793F truck per lane**
  - **1% crossfall expit**
  - **Median and outside bunds designed for 7.6m tyre diameter**

Type	CAT793F Dump Truck
Width (m)	7.68
Tyre	40R57
Tyre Diameter (m)	7.605

Road – Bunds - Water



- 5m offset from pit crest
- Road above 1:100 water management slope
- Road base of 1m graded 1% away from pit

Real View

TRONOX

Service Corridor Intersection

Service Corridor

Mobile Mining Unit

Entry into Mining Area

Haul Road

Haul Road

Switch Back Design

Switch Back Design

Keeping To Our Standards

TRONOX

AP_ME_3.2.F421 – Authority For Mining Activities

This form is to be completed by a Tronox Mining Coordinator and Contractor Mining Leadership for all,

- Pit excavation,
- Tip heads
- Paddock dump
- Ramp introduction or changes
- Intersection introduction or changes
- Road introduction or changes.
- TOD areas

Approval is required by the Mine Manager or delegated responsible person in the absence of the Mine Manager before any activity is undertaken on or in introduced or changed areas.

Coordinator: _____ **Date:** _____

Supervisor/Manager: _____ **Date** _____

Description of proposal and location:

Paddock dump:

Is paddock dump in accordance to mining plan?	Yes	No
Is dump near pond edge or silt/slimes/tailing cells?	Yes	No
Is dump within 50m of roads or other infrastructure not used for tipping activity?	Yes	No
Is there suitable and safe entry and exit points?	Yes	No
Is there adequate lighting?	Yes	No
Is there a light vehicle park up area?	Yes	No
Is there a HME breakdown area?	Yes	No
Is there a look out area?	Yes	No
Has a traffic management plant been developed and circulated to all operators?	Yes	No
Is there or will there be any interaction with any other mining activity?	Yes	No
Do all associated roads, ramps, intersections, and signage comply to the Tronox design standards?	Yes	No
Is paddock dump designed to allow for a minimum of 4 dump separation between all HME?	Yes	No
Is there adequate bunting/safety berms/ delineation	Yes	No

TRONOX

AP_ME_3.2.F421 – Authority For Mining Activities

Tip Head:

Is Tip Head in accordance to mining plan?	Yes	No
Is Tip Head near or over pond edge or silt/slimes/tailing cells?	Yes	No
Is Tip Head within 50m of roads or other infrastructure not used for tipping activity?	Yes	No
Is there suitable and safe entry and exit points?	Yes	No
Is there adequate lighting?	Yes	No
Is there a light vehicle park up area?	Yes	No
Is there a HME breakdown area?	Yes	No
Is there a look out area?	Yes	No
Has a traffic management plant been developed and circulated to all operators?	Yes	No
Is there or will there be any interaction with any other mining activity?	Yes	No
Do all associated roads, ramps, intersections, and signage comply to the Tronox design standards?	Yes	No
Is Tip Head designed to allow for a minimum of 4 dump separation between all HME?	Yes	No
Is there adequate bunting/safety berms/ delineation	Yes	No
Is the truck standoff to tip crest known and circulated	Yes	No
Is there an established standoff indicator system adopted and active	Yes	No

In Pit Excavation Area:

Is excavation in accordance to mining plan?	Yes	No
Is excavation near pond edge or silt/slimes/tailing cells?	Yes	No
Is excavation within 50m of roads or other infrastructure not used for excavation activity?	Yes	No
Is there suitable and safe entry and exit points?	Yes	No
Is there adequate lighting?	Yes	No
Is there a light vehicle park up area?	Yes	No
Is there a HME breakdown area?	Yes	No
Is there a look out area?	Yes	No

TRONOX

AP_ME_3.2.F421 – Authority For Mining Activities

Has a traffic management plant been developed and circulated to all operators?	Yes	No
Is there or will there be any interaction with any other mining activity?	Yes	No
Do all associated roads, ramps, intersections, and signage comply to the Tronox design standards?	Yes	No
Is there adequate bunting/safety berms/ delineation	Yes	No

Intersection:

Does the intersection comply with Tronox road design standards?	Yes	No
Does the intersection require being designed to Tronox road design standards?	Yes	No
Is the change temporary? (Shifts)	Yes	No
Is the change semi-permanent? (Months)	Yes	No
Is the change permanent? (Years)	Yes	No
Will it adversely affect the visibility from the Light Vehicles?	Yes	No
Has an operator checked?	Yes	No
Will it adversely affect the visibility from Heavy Vehicles?	Yes	No
Has an operator checked?	Yes	No
Will it affect the ability of a Heavy Vehicle to see a Light Vehicle or visa-versa?	Yes	No
Will the T – intersection be less than 70°?	Yes	No
Does the signage comply with Tronox road design guidelines	Yes	No

Road:

Two-way traffic – is the road width 3.5 x the width of the largest vehicle for dump truck haul roads?	Yes	No
One way traffic – is the road 1.5 x the width of the largest vehicle for dump truck haul roads?	Yes	No
Are each lane 1.5 x the width of the largest vehicle that would use the road on a regular basis without an escort?	Yes	No
Is there adequate drainage for water to run off road	Yes	No

TRONOX

AP_ME_3.2.F421 – Authority For Mining Activities

Ramp:

Does the ramp have a gradient steeper than 1/10	Yes	No
Is there clear visibility at the top and bottom of ramp for oncoming traffic	Yes	No
Is the bottom of the ramp designed to control a runaway truck, adequate room and bunting to stop safely, delineation from oncoming traffic	Yes	No
Is there adequate drainage for water to run off ramp without washing out in a normal rain event	Yes	No
Does the Ramp have adequate bunting, safety berms and delineation	Yes	No

TOD Blend and Feed area:

Is TOD Blend Feed area in accordance to mining plan?	Yes	No
Is MMU in correct position and safe distance from highwall?	Yes	No
Is TOD Blend Feed area 50m from roads or other infrastructure not used for MMU activity?	Yes	No
Is there suitable and safe entry and exit points (consider emergencies)?	Yes	No
Is there adequate lighting?	Yes	No
Is there a light vehicle park up area?	Yes	No
Is there a refuelling bay and proceedure	Yes	No
Is there adequate and clear signage including call up signs at all entry points, and signs to advise workers of *"no go zones"*	Yes	No
Is there adequate lighting for all planned activities	Yes	No

Consultation as required e.g. Tech Services, Operations Crew, Maintenance – who & when?

_____

_____

Mine Manager: _____ **YIF Mining Manger** _____

If any of the above answers circled are **red**, the attached plan must be completed.

TRONOX

We are working on levels 1 – 7 what about levels 8 & 9?

TRONOX / YELLOW IRON FLEET

“L7, L8, L9” CAT DETECT TIMELINE

Fleet Delivery
June 1, 2022

Object Detection L7

- Machine dependant
- Radars
- Cameras

Q3 2023

Proximity Detection L8

- Target commercially available
- Personnel Nodes
- HV Kits
- LV Kits

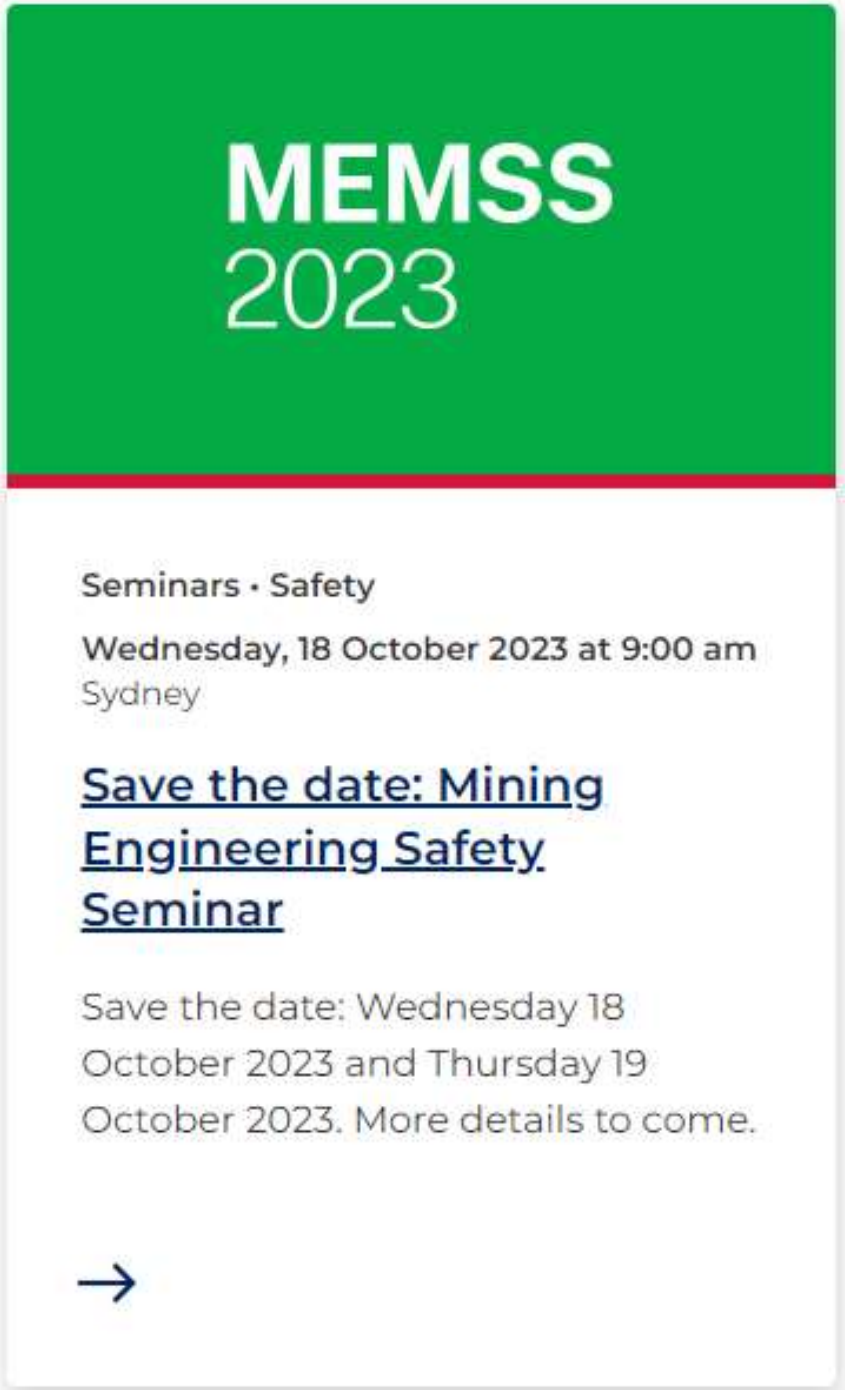
Q1 2024

Collision Avoidance L9

- Target commercially available
- Machine dependent
- Inclusion of a Proximity Detection Interface Module (PDIM)

Questions

Upcoming events



Resources Regulator
Department of Regional NSW

NSW GOVERNMENT

Thank you

The feedback survey will be sent out shortly. Thank you