# **Incident Investigation Report**

#### Incident: Fall of ground incident

**Description:** A rockfall occurred at 3:15 PM following a blast operation, striking an excavator and injuring operator John Miller who sustained a twisted ankle and bruises.

Visibility: Company Created By: eraydinekin@gmail.com Created At: Feb 20, 2025, 12:10 PM Last Updated At: Feb 20, 2025, 12:11 PM

### **Detailed Description of the Event**

Last updatedMay 18, 2025, 05:19 PM• eraydinekin@gmail.comApprovedMay 18, 2025, 05:19 PM• eraydinekin@gmail.com

On July 28, 2024, at approximately 3:15 PM, a significant rockfall occurred at North Pit, Section A of an undefined metal mine in New South Wales. The incident happened shortly after a scheduled blast was conducted in the adjacent Section B at 3:00 PM. After receiving clearance at 3:05 PM to resume operations, an excavator operator had recommenced work at 3:10 PM. At approximately 3:15 PM, a large section of the highwall suddenly collapsed, causing rocks and debris to strike the excavator. The operator managed to exit the machine but sustained minor injuries including a sprained ankle and bruises. The incident resulted in significant damage to the excavator and led to an immediate suspension of operations in the area. The emergency response team was activated, and the area was secured for investigation.

### **Brief Description of the Event**

Last updatedMay 18, 2025, 05:21 PM• eraydinekin@gmail.comApprovedMay 18, 2025, 05:21 PM• eraydinekin@gmail.com

On July 28, 2024, at approximately 3:15 PM, a significant rockfall occurred at the highwall in North Pit Section A of an undefined metal mine in New South Wales, shortly after a blast was conducted in the adjacent Section B at 3:10 PM, resulting in damage to an excavator and minor injuries (bruises and sprained ankle) to its operator. The rockfall involved a substantial amount of debris falling from the highwall, impacting the excavator which was operating near the base of the wall.

### **Root Cause Analysis**

Last updated	May 11, 2025, 07:10 PM	•	eraydinekin@gmail.com
Approved	May 11, 2025, 07:10 PM	•	eraydinekin@gmail.com

#### 1. Inadequate Post-Blast Inspection Protocol

A critical failure in the inspection process after blasting, where subtle indicators of instability were overlooked due to rapid visual assessment rather than detailed examination. This is considered a root cause as a proper inspection would have identified the hazards and prevented work resumption.

Contributing Factor	Explanation
Quick Visual Scan Only	Robert Wilson's team conducted only a basic visual inspection without detailed assessment of potential failure indicators
Lack of Geotechnical Input	No geotechnical engineer was involved in post-blast inspec- tion despite recent heavy rainfall conditions
Inadequate Communication	Critical information about minor cracks and water seepage was not communicated to the excavator operator

#### 2. Environmental Impact on Ground Stability

The combination of significant rainfall (150mm in previous week) and blast vibrations created conditions for failure. This is a root cause as it created the fundamental instability that led to the rockfall.

Contributing Factor	Explanation
Heavy Rainfall Saturation	Recent rainfall significantly weakened the rock mass and cre- ated lubricated failure planes
Blast Vibration Effects	Vibrations from nearby blast in Section B triggered movement in the already weakened rock mass
Insufficient Drainage Systems	Existing water management systems failed to adequately con- trol water infiltration into the highwall

## **Timeline Builder**

Last updated Approved May 11, 2025, 01:03 PM • eraydinekin@gmail.com May 11, 2025, 01:03 PM • eraydinekin@gmail.com

Time- line	28/07/24 06:00	28/07/24 14:45	28/07/24 15:00	28/07/24 15:05	28/07/24 15:10	28/07/24 15:14	28/07/24 15:15	28/07/24 15:18	28/07/24 15:20	28/07/24 15:25
Event	Shift started	Blast prepara- tion begins in Section B	Blast executed in Section B	Post-blast in- spection con- ducted	Operations cleared to resume in Section A	John Miller observes loose material but continues work	Rockfall oc- curs striking excavator	Supervisor Lisa Thompson arrives on scene	Emergency response team activated	Area secured and incident response initi- ated
Rea- son1	-	-	-	Inadequate post-blast inspection protocol	Insufficient risk assessment before clearing work	Hazard re- porting cul- ture needs im- provement	Highwall sta- bility compro- mised	-	-	-
Rea- son2	-	-	-	Visual inspec- tion only - no instru- mented moni- toring	Recent weather conditions not adequately considered	Assumption that post-blast inspection was thorough	Recent heavy rainfall weak- ened rock mass	-	-	-
Rea- son3	-	-	-	Time pressure to resume op- erations	No formal risk assess- ment process for weather impacts	Lack of clear hazard re- porting proce- dures	Blast vibra- tions affect- ed weakened structure	-	-	-

Rea- son4	-	-	-	Geotechnical expertise not involved in inspection	Inadequate controls for managing ground conditions	Fear of pro- duction delays	Insufficient controls for managing water infiltration	-	-	-
Rea- son5	-	-	-	No for- mal compe- tency require- ments for in- spectors	Production priorities overshadow- ing safety concerns	Normalized deviation from safety procedures	Inadequate ground control management system	-	-	-

# Key Learnings

Last updatedMay 18, 2025, 05:21 PM• eraydinekin@gmail.comApprovedMay 18, 2025, 05:21 PM• eraydinekin@gmail.com

Contributing Factor	Action	Description
Inadequate post-blast inspection protocol	Implement comprehensive post-blast inspection checklist	Develop and implement a detailed inspection checklist that includes specific criteria for assessing highwall stability, water seepage, crack formation, and other geotechnical fac- tors after blasting activities
Inadequate post-blast inspection protocol	Mandate dual verification system	Require two qualified personnel (OCE and Geotechnical rep- resentative) to independently assess and sign off on high- wall stability before resuming operations
Impact of recent heavy rainfall	Enhance water management systems	Upgrade drainage infrastructure to better manage surface water runoff and prevent water infiltration into highwalls, including installation of additional drainage channels and regular maintenance protocols
Impact of recent heavy rainfall	Implement rainfall-triggered inspection protocol	Establish specific thresholds for rainfall amounts that trig- ger mandatory additional geotechnical inspections before continuing operations
Insufficient risk communication	Enhance pre-start communication protocol	Implement mandatory detailed briefings for operators about specific hazards, including recent blast impacts, weather conditions, and observed geological features
Insufficient risk communication	Develop real-time hazard reporting system	Implement a digital system for immediate reporting and communication of observed hazards to all relevant person- nel
Inadequate blast impact assessment	Implement advanced monitoring technology	Install slope stability radar and vibration monitoring systems to continuously assess highwall stability before, during, and after blasting operations

Inadequate blast impact assessment	Review and update blast design parameters	Modify blast designs to include larger safety margins when blasting near potentially compromised highwalls, including reduced charge weights and adjusted timing sequences
Insufficient Take 5 risk assessment	Enhance Take 5 document format	Revise Take 5 format to include specific prompts for geot- echnical hazards and post-blast conditions, with mandatory consideration of recent weather impacts
Insufficient Take 5 risk assessment	Implement Take 5 verification process	Require supervisor review and sign-off on Take 5 assess- ments for high-risk activities such as working near recently blasted areas

Last updatedMay 11, 2025, 07:08 PM• eraydinekin@gmail.comApprovedMay 11, 2025, 07:08 PM• eraydinekin@gmail.com

ContributingFactor	Explanation
Recent heavy rainfall (150mm) weakening the rock mass and creating lubricated failure planes	Clearly documented in geotechnical report with specific rainfall measurements and evidence of water seepage observed post-incident
Blast vibrations from nearby Section B blast destabilizing already weakened highwall	Multiple witness statements confirm temporal connection between blast and failure, sup- ported by geotechnical analysis
Insufficient post-blast inspection protocols failing to identify subtle instability indicators	Documented in geotechnical report that inspection was quick visual scan rather than de- tailed examination
Inadequate communication of potential risks to excavator operator	John Miller's statement confirms he wasn't informed about minor cracks and water seepage observed during inspection
Insufficient water management systems for controlling surface water infiltration	Identified in geotechnical report as inadequate for mitigating significant rainfall impacts
Incomplete Take 5 risk assessment by operator	Take 5 form shows rockfall hazards were not identified despite working near highwall
Lack of continuous monitoring systems for highwall stability	Identified as a gap in controls by geotechnical engineer but impact on incident is less directly evident
Proximity of blast to unstable highwall area (30 meters)	Distance documented in geotechnical report but unclear if this was closer than normal practice
Delayed evacuation response by operator after initial warning signs	Operator's statement indicates hearing rumble before attempting to move, but timing se- quence is not precisely clear

# **ICAM Analysis**

Last updated May 11 Approved May 11

May 11, 2025, 01:06 PM • eraydinekin@gmail.com May 11, 2025, 01:06 PM • eraydinekin@gmail.com

Category	Evaluation
Absent / Failed Defences	<ul> <li>SM1: Inadequate risk management system failed to identify and control the heightened risks associated with excavation operations near recently blasted areas</li> <li>SM6: Insufficient monitoring systems to detect early warning signs of highwall instability, particularly after blast activities</li> <li>TU2: Absence of real-time slope stability monitoring equipment that could have provided early warning of impending wall failure</li> <li>PR2: Inadequate post-blast inspection procedures that did not sufficiently account for cumulative effects of blast vibration and recent rainfall</li> </ul>
Individual / Team Actions	<ul> <li>IN1: The excavator operator (John Miller) made an incomplete situation assessment when observing loose material but continuing work</li> <li>TY6: Blast crew leader (Robert Wilson) provided insufficient communication regarding potential risks when clearing the area for resumed operations</li> <li>WP1: Team risk management practices were inadequate, with multiple parties failing to properly assess the combined risks of recent rainfall and blast vibrations</li> <li>CF3: Communication quality between blast crew and operations team was insufficient regarding potential hazards and required precautions</li> </ul>
Task / Environmental Conditions	<ul> <li>EC1: Significant rainfall (150mm) in the week prior to the incident had compromised ground conditions</li> <li>TD6: Non-standard activity of operating near a recently blasted area created additional unrecognized risks</li> <li>EC3: Recent blast vibrations had affected ground stability in the adjacent working area</li> <li>ER2: Inadequate warning systems for detecting and alerting to highwall instability</li> </ul>

Organisational Factors	<ul> <li>SM5: Inadequate change management process for assessing cumulative risks when conducting blasting near active excavation areas</li> <li>TC3: Training quality issues regarding recognition and response to highwall stability risks</li> </ul>
	<ul> <li>QC7: Evidence of risk normalization in continuing operations despite presence of warning signs</li> </ul>
	<ul> <li>SM3: Insufficient implementation of risk management arrangements for coordinating blast activities with ongoing excavation operations</li> </ul>
	QA4: Poor interdepartmental communications and coordination between blast crew and excavation teams

## **PEEPO Builder**

Last updatedMay 18, 2025, 05:19 PMeraydinekin@gmail.comApprovedMay 18, 2025, 05:19 PMeraydinekin@gmail.com

Category	Details	Other	RelevantData
People	<ul> <li>John Miller (Excavator Operator - injured)</li> <li>Lisa Thompson (Area Supervisor)</li> <li>Robert Wilson (Shotfirer)</li> <li>Mark Johnson (Production Manager)</li> <li>James Anderson (OCE)</li> <li>Dr. Anthony Richards (Geotech Engineer)</li> </ul>	<ul> <li>Miller has 5 years experience</li> <li>Thompson has 3 years experience</li> <li>Wilson conducted blast and inspection</li> <li>Anderson was OCE on duty</li> </ul>	<ul> <li>Training records for all personnel</li> <li>Competency assessments</li> <li>Fatigue management records</li> <li>Communication logs between crew members</li> </ul>
Environment	<ul> <li>Heavy rainfall (150mm) in past week</li> <li>Water seepage observed in failure plane</li> <li>40m highwall height</li> <li>Sedimentary rock layers with coal seams</li> </ul>	<ul> <li>Blast conducted 30m from failure location</li> <li>Post-blast vibrations noted</li> <li>No immediate signs of instability pre-incident</li> </ul>	<ul> <li>Weather records</li> <li>Groundwater monitoring data</li> <li>Geotechnical monitoring records</li> <li>Blast vibration measurements</li> </ul>
Equipment	<ul> <li>Excavator (damaged)</li> <li>Blast monitoring equipment</li> <li>Communication radios</li> <li>Drainage systems</li> </ul>	<ul> <li>Excavator position relative to highwall</li> <li>Blast design parameters</li> <li>Equipment inspection records</li> </ul>	<ul> <li>Excavator maintenance records</li> <li>Equipment pre-start checks</li> <li>Monitoring equipment calibration records</li> <li>Drainage system maintenance records</li> </ul>

Procedures	<ul> <li>Working Near Crests and Slopes Procedure</li> <li>Post-blast inspection protocol</li> <li>Take 5 risk assessment</li> <li>Emergency response procedures</li> </ul>	<ul><li>Blast design specifications</li><li>Inspection requirements</li><li>Risk assessment processes</li></ul>	<ul> <li>Compliance with procedures</li> <li>Effectiveness of risk assessments</li> <li>adequacy of inspection protocols</li> <li>Emergency response effectiveness</li> </ul>
Organization	<ul> <li>Shift handover processes</li> <li>Management oversight</li> <li>Safety systems</li> <li>Communication protocols</li> </ul>	<ul><li>Reporting structure</li><li>Resource allocation</li><li>Safety culture</li></ul>	<ul> <li>Management review processes</li> <li>Safety audit results</li> <li>Communication effectiveness</li> <li>Resource adequacy assessment</li> </ul>