



Fitzroy Resources Carborough Downs Coal Mine

Level 1 exercise report

Exercise location	Fitzroy Resources Carborough Downs Coal Mine
QMRS focused event exercise date	Sunday 30 October 2022
Mine focused event exercise date	Wednesday 23 November 2022
Report author	Geoff Nugent Inspector of Coal Mines and Chair 2022 State Emergency Exercise, Executive Management Committee

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This publication has been compiled by the Chair 2022 State Emergency Exercise Executive Committee, Geoff Nugent of the Coal Mine Inspectorate, Resources Safety and Health Queensland.

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Abbreviations and glossary

Term	Definition
Approved standard	A standard made for safety and health under the repealed <i>Coal Mining Safety and Health Act 1925</i> stating ways to achieve an acceptable level of risk to people arising out of coal mining operations
CABA	Compressed air breathing apparatus
CDCM	Carborough Downs Coal Mine
CPR	Cardiopulmonary resuscitation
CH ₄	Methane
CITECT	Brand name of SCADA system
CO	Carbon monoxide
CO ₂	Carbon dioxide
CMT	Crisis Management Team. The corporate team set up by the mine to monitor the incident.
CMW	Coal mine worker
Continuous miner (CM)	Coal cutting machine used to develop new roadways in a mine
crib room	Location where mineworkers eat and a meeting station for the ERZ controllers
CRO	Control room operator
Cut-through (ct)	A passage cut through the coal, connecting two parallel headings
DAC	Direct audio communications Underground intercom system also referred to as the <i>tannoy</i>
Deputy	Safety supervisor who makes statutory inspections not referred to as an ERZ controller in Queensland regulation
Drift runner	Brand name for a flameproof diesel-powered man-riding vehicle carrying up to 12 personnel. Sometimes interchanged with PJB which is a different brand.
Downcast	Shaft of bore hole where air enters the mine. Sometimes referred to as an intake shaft.
Eimco	Brand name of a flameproof diesel-powered mechanical loader. Can be referred to as a load haul dump machine
ERZ	Explosion risk zone
ERZC	Mine worker responsible for safety inspections traditionally referred to as a Deputy
Face	The exposed surface of a coal deposit in the working place where mining is proceeding

Term	Definition
Fresh air base (FAB)	A continuously monitored station for dispatch or return of rescue teams in close proximity to irrespirable zones
Gas chromatograph (GC)	A laboratory instrument used to analyse the composition of gas samples
Go line	An assembly area on the surface where mobile plant is left after servicing and when available for use
HMP	Hazard management plan
IAP	Incident action plan—developed by the IMT and signed off so that each of the teams, logistics, operations and planning have clear direction
IC	Incident Controller – Most senior person in the IMT
IMT	Incident Management Team (term is interchangeable with ICT)
Inbye	Mining term for going into the underground mine (away from the surface) from the point of reference
Industry Safety and Health Representative (ISHR)	A person who is appointed under section 109(1)5 of the <i>Coal Mining Safety and Health Act 1999</i> to represent coal mine workers on safety and health matters and who performs the functions and exercises the powers of an industry safety and health representative mentioned in part 8, division 2
Intake (roadway)	A name or fresh air as defined in the coal mine regulations
Loader	diesel powered mechanical loader. Can be referred to as a load haul dump machine
Level 1 mine emergency exercise	State level mine emergency exercise recommended in the Moura inquiry, designed to test the mine's emergency response system; test the ability of external services to administer assistance; and provide a focal point for emergency preparedness in the state
Longwall (LW)	A method of mining coal deposits, in which the working face is retreated over a considerable width at one time
Mines Inspector	Official employed to make examinations of, and to report upon, mines and surface plants for compliance with mining laws, rules and regulations, safety methods
Mines Inspectorate	The organisation which controls the mines inspectors
MEMS	Mine Emergency Management System
Mole	Name used to refer to the mine site representative on the organising committee for the level 1 mine emergency exercise
NWM	North West Mains
Non-verbal communication	Method of communicating using beeps on a telephone or DAC similar to Morse code

Term	Definition
O ₂	Oxygen
Outbye	Mining term for out of the underground mine (towards the surface) from the point of reference
Panel	The working of coal seams in separate panels or districts, e.g. single unit panel—a longwall face is sometimes referred to as a panel
Personal emergency device (PED)	Ultra-low frequency through-the-earth communication system used for paging—originally developed to provide a fast and reliable method of informing underground miners of emergency situations
Portal	The surface entrance to an underground mine
ppm	Parts per million
QMRS	Queensland Mines Rescue Service
Recognised standard	A standard made for safety and health under the <i>Coal Mining Safety and Health Act 1999</i> stating ways to achieve an acceptable level of risk to people arising out of coal mining operations
Return (Roadway)	Name for air that has ventilated a working face often contaminated with heat, dust and gases
Rib	The solid coal on the side of a gallery or longwall face; a pillar or barrier of coal left for support
Safegas	Brand name of a mine gas monitoring system (developed by Simtars)
Self-contained self-rescuer (SCSR)	A respiratory device used by miners for the purpose of escape during mine fires and explosions—it provides the wearer a closed-circuit supply of oxygen for periods of time usually less than 1 hour
SEM	South East Mains
Simtars	Safety in Mines Testing and Research Station
SSE	Site Senior Executive
Stopping	A ventilation control device which stops ventilation flow through a roadway
Tag board	Peg board where underground personnel place a token to indicate their presence in a section of the mine
UMM	Underground Mine Manager—person appointed by the SSE to control and manage the mine
Undermanager	Mineworker who is in charge of the mine on a shift basis (i.e. shift supervisor)
Upcast	Shaft of borehole where the air leaves the mine. Sometimes referred to as a return shaft
Ventsim™	Ventilation modelling software

Term	Definition
VCD	Ventilation control device—an air door, stopping, seal or brattice
VO	Ventilation Officer—person appointed by the underground mine manager responsible for coordination of all ventilation related activities at the mine including running a computer base ventilation modelling system

Foreword

Mark Bobeldyk, Site Senior Executive (SSE) of Carborough Downs Coal Mine

Carborough greatly appreciate the resources provided by Resources Safety and Health Queensland, Simtars, Queensland Mines Rescue Service, Industry Safety and Health Representatives, and other mine sites in conducting both of the focused Level 1 exercise events.

Through both preparation and post event phases, Fitzroy and our mine site has benefitted from a number of key learnings that have helped to improve our emergency response systems.

Our hope is that this experience and the findings in this report, benefit other mines in their endeavours for continuous improvement in relation to implementation of their emergency response systems.

Preface

This report has been compiled by the State Emergency Exercise Executive Management Committee, under the guidelines provided in [Recognised Standard 8, Conduct of Mine Emergency Exercises](#). Assessors have provided an account of their part of the exercise for this report. Each assessor's full timeline of events is available in the appendices.

The committee would like to thank all assessors for their input and acknowledge the co-operation and assistance of all those involved in both the 2022 Level 1 Mine Emergency Exercises. In addition, the committee would also like to thank Carborough Downs Coal Mine for participating in the exercises and providing SCSRs and CABA for use during the exercise, adding to the reality of the experience for evacuating coal mine workers.

Executive summary

This report covers the 2022 Level 1 Mine Emergency Exercise at Carborough Downs Coal Mine.

Carborough Downs is an underground longwall and bord & pillar mining operation, located 25km east of Moranbah in the heart of the Bowen Basin. (See Figure 1).

In all, 33 assessors took part in the exercise, with representatives from Oaky North Coal Mine, Simtars, Resources Safety and Health Queensland's Mines Inspectorate, Queensland Mines Rescue Service (QMRS), an industry safety and health representative (ISHR) from the Construction, Forestry, Mining and Energy Union, Minerals Industry Safety and Health Centre, Office of the Commissioner for Resources Safety and Health, Anglo Coal head office and mine staff, from Grosvenor, Broadmeadow, Aquila, Carborough Downs coal mines. This report contains several writing styles, and each input has been reviewed and edited to provide a consistent theme.

Due to previous Level 1 emergency exercise experience, the 2022 Level 1 format was modified to improve

the opportunity for both the host mine and QMRS to test their emergency response systems and enhance learnings.

The 2022 exercise was conducted as two distinctly separate events. A Mine-focused event held 23 November 2022 and a QMRS focused event held 30 October 2022.

This report contains a description of each exercise scenario and comments from assessors including their observations of what went well and areas for improvement in multiple areas of each emergency response exercise.

Further, recommendations are provided for the Queensland Mines Rescue Service and all Queensland underground coal mines to consult when reviewing their respective Safety and Health Management Systems.

Geoff Nugent

Chair 2022 State Emergency Exercise Executive Committee

2022 Exercise changes

From previous Level 1 exercises, assessors consistently identify the time and scale of Level 1 emergency exercises as a significant impediment to the adequate testing of both the host mines and Queensland Mine Rescue Service's (QMRS) safety and health management system (SHMS).

Of particular concern was how information and data is analysed in the risk-management process and how that informs the decision-making of the Incident Management Team (IMT) and deployment of mines rescue teams.

To ensure future Level 1 exercises effectively test emergency response systems and enhances learning opportunities for industry, the committee decided to adapt the format of the exercise for 2022.

To improve the opportunity for both the host mine and QMRS to test their emergency response systems and to enhance learnings, the 2022 exercise was conducted as two distinctly separate events.

QMRS-focused event

This event was held 30 October 2022. The purpose of this event is to thoroughly test the QMRS emergency response and mutual assistance systems for an underground emergency scenario.

This exercise included:

- an emergency scenario in an area of the mine that has no effect on the mine's production activities.
- underground mines are expected to provide mines rescue team members as required by QMRS, as per their mines rescue agreement obligations.

The host mine was not required to initiate its site emergency response system.

Both events were hosted by Fitzroy Mining's Carborough Downs Coal Mine underground operation.

Mine-focused event

This event was held 23 November 2022. The purpose of this event was for the mine to thoroughly test its site emergency response system, application of risk management processes, and the capability of external

services to administer assistance.

This exercise included:

- an emergency scenario initiated on the mine site that requires the mine to practically apply their emergency response system.
- mobilisation of QMRS and other external services - if/as required.

Where QMRS was required to be mobilised for the scenario only the permanent QMRS employees responded i.e.

- Operations Managers, to apply the QMRS Mine Emergency Management System in consultation with the mine Incident Management Team to develop a risk-based plan for mines rescue team's deployment.
- Other QMRS employees to mobilise Mines Rescue equipment to the mine.

**Mines rescue volunteer team members were not mobilised for this mine-focused exercise event*

Carborough Downs Coal Mine (CDCM)

Carborough Downs is an underground longwall and bord & pillar mining operation, located 25km east of Moranbah in the heart of the Bowen Basin. The mine extracts coal from the Leichhardt Seam which ranges between 4.5 – 5.7m in thickness and produces metallurgical coal sold to meet the growing needs of international steel demand. The mine commenced production in 2006 and is a proud contributor to the local and regional economies, currently employing ~500 people. With a remaining mine life more than ten years.

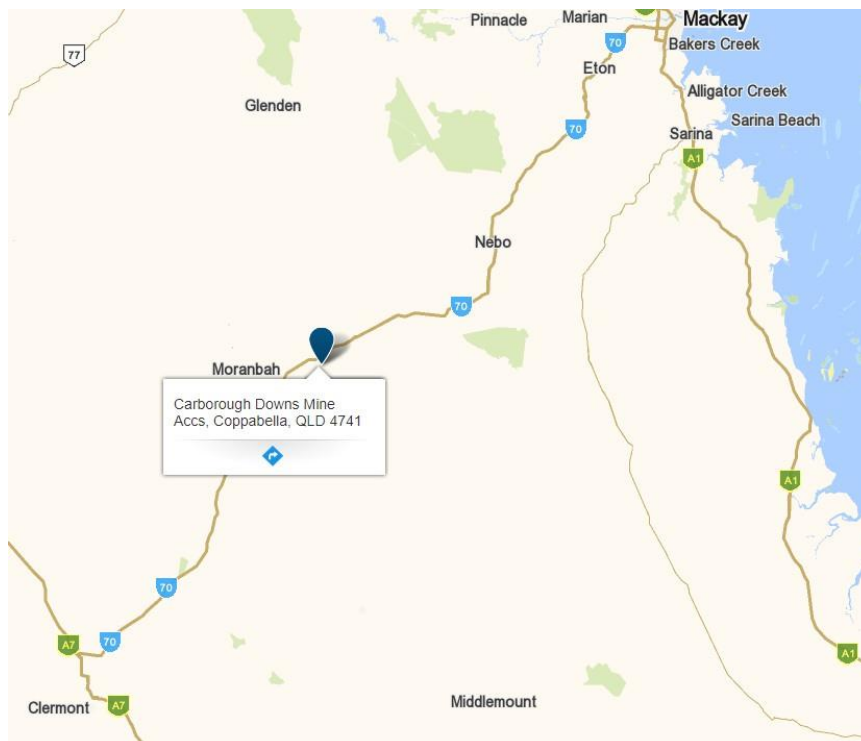


Figure 1 Location Map for Carborough Downs Coal Mine

Underground mine description and operational status

CDCM underground operations includes Longwall and Bord and Pillar mining methods. Development

mining of Longwall gate roads and main headings is still operational at the mine.

The underground mine comprises of two distinct operational zones,

- NWM comprising LW14, NWM Development and LW14a Development
- SEM comprising bord and pillar development and Roadheader stone drift development.

The mines main ventilation is provided by two separate shafts and main fan installations.

- #2 Shaft Fan #6 located at juncture of North Mains and NWM F heading providing 236m³/s for LW14, NWM Development and LW14a Development.
- #1 Shaft Fan #3, East Mains B heading 69ct, providing 160m³/s for SEM bord and pillar development and Roadheader stone drift development.

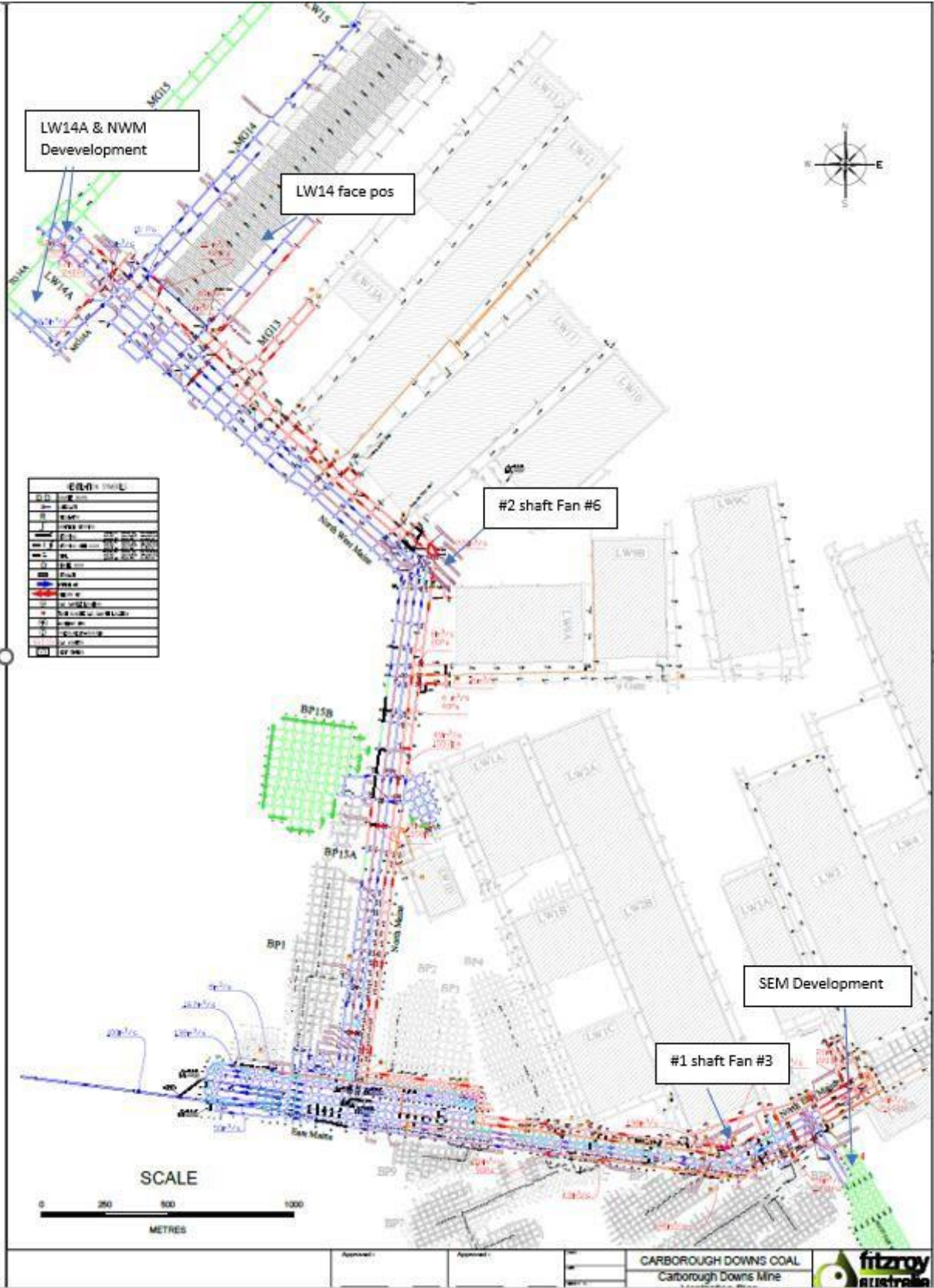


Figure 2 CDCM Mine plan

Background

This report covers the 2022 Level 1 Mine Emergency Exercises held at Carborough Downs Coal Mine on Sunday 30 October 2022 (QMRS focused event) and Wednesday 23 November 2022 (Mine focused event).

The Queensland Mining Warden's inquiry into the explosion at the Moura No. 2 mine in August 1994 recommended:

"Emergency procedures should be exercised at each mine on a systematic basis, the minimum requirement being on an annual basis for each mine" (Windridge et al 1996).

In December 1996, the *Approved Standard for the Conduct of Emergency Procedures Exercises* was published. This approved standard was updated and issued as *Recognised Standard 8 Conduct of Mine Emergency Exercises (RS8)* in June 2009. It provides guidelines for conducting mine site emergency exercises, including the requirement to test state-wide emergency responses by holding an annual exercise at an underground mine.

It is 28 years since the Moura No 2 disaster, and 12 years since the Pike River disaster in New Zealand. The Pike River Royal Commission outcomes led New Zealand to adopt similar legislation regarding emergency exercises.

Since 1998, 25 Level 1 mine emergency exercises have been held at coal mines in Queensland.

Objectives

The objectives of the exercise were set using the requirements of Recognised Standard 08 and by reviewing previous exercise reports. The objectives were to test:

- the ability of coal mine workers (CMWs) to self-escape
- mine site incident response
- the ability for triage of injured CMW
- donning of self-contained self-rescuers (SCSR) and the changeover to compressed air breathing apparatus (CABA)
- interaction with industry safety and health representative (ISHR) and the Queensland Mines Inspectorate
- mobilisation of Queensland Mines Rescue Service (QMRS), risk assessment process for the mine re-entry, the establishment of a fresh air base (FAB) and locate a missing CMW.

The exercise is the focal point for emergency preparedness in the state.

QMRS focused event

Exercise design

The QMRS focused event was conducted on Sunday 30 October 2022

The objective of the QMRS focused exercise was to provide an improved opportunity to test and evaluate the QMRS emergency response system from emergency initiation, through deployment and operational activities of mines rescue teams and equipment.

For the underground element of the exercise QMRS operational documents including Captains task sheets, Authority to enter, mine plans etc, were pre-prepared by the assessment team for QMRS Operations Managers to implement with mines rescue teams.

The operational area for mines rescue teams was selected to have minimal impact on mining operations but still provide for realistic environment to apply procedures and protocols.

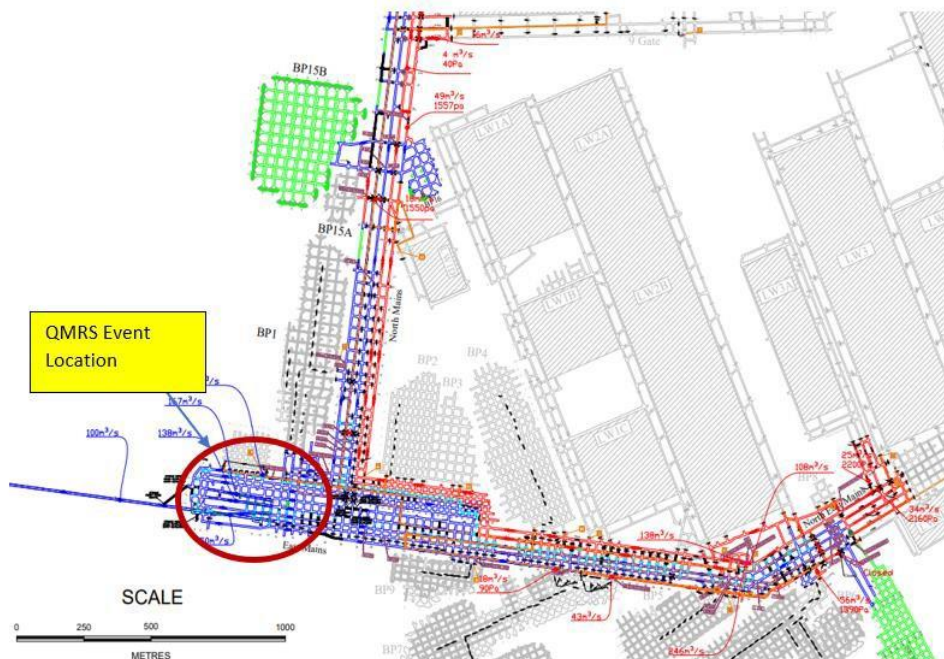


Figure 3 Mines rescue teams' operational area

Scenario

The scenario comprised of a gas alarm (Tube bundle point 3) indicating unacceptable gas concentrations in the East Mains 12ct Y -X heading because of a damaged seal and ventilation interruption from a roof fall.

Further a mine ERZ Controller was unaccounted for, and last known location was in the area affected by the unacceptable gas concentrations.

It was anticipated that QMRS would target a minimum of three mines rescue teams (15 – 18 team members) in addition to technical support (Fresh Air Base (FAB)) members.

The primary objectives for two mines rescue teams were.

- FAB set up – correct, control of area, comms to surface, comms to team
- 2 heading search and patient carry for return to FAB – Effective and safe search pattern, Patient care, stretcher care and does Standby team activate to assist
- Effective inspection – does captain/team notice missing seals, correct seal mapping/drawings
- Bag sampling – purge line, correct sampling procedure, tags filled in properly – Check if sampling points are located on seals
- BG4 to SCSR change over. Comms to FAB, activate standby team. Immediate return to FAB. Remove cylinder and leave BG4.

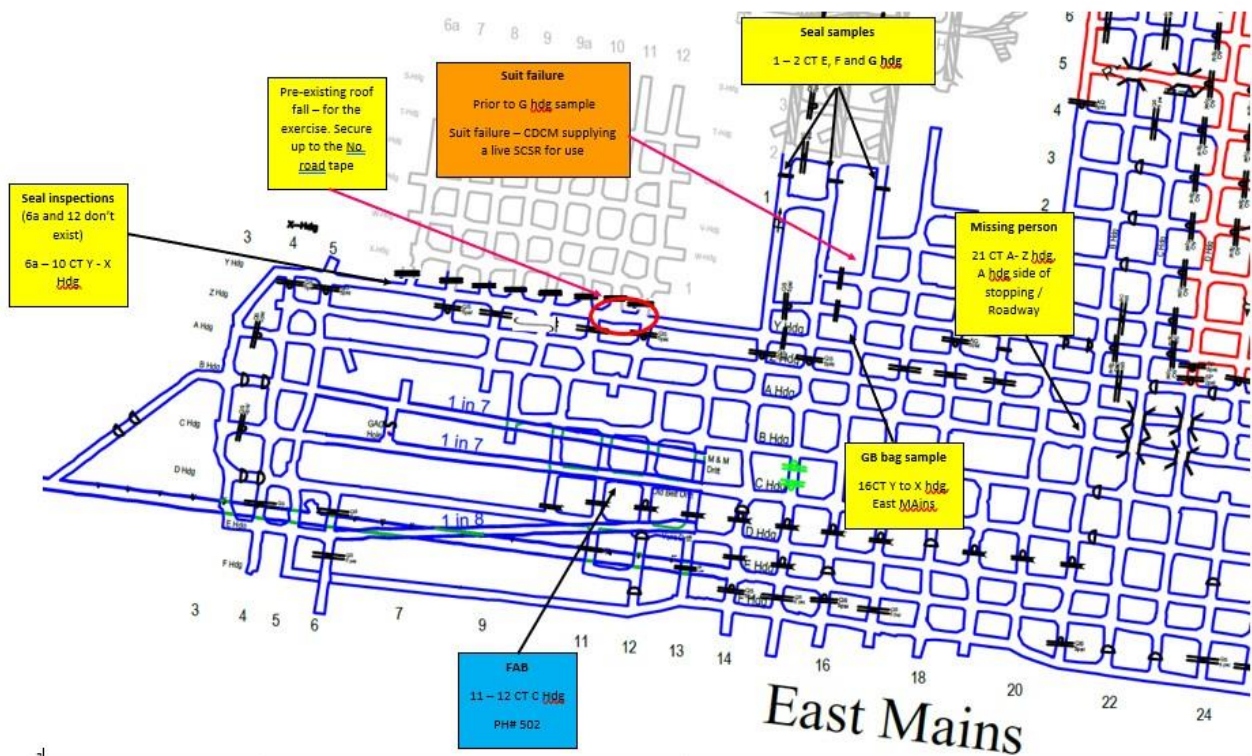


Figure 4 plan identifying key underground activities

Assessment of the scenario

QMRS Event assessors

Name	Location	Organisation
Peter Purdie	Underground	Anglo Moranbah North
Garrett Thompson	Underground	Anglo Moranbah North
Carl Skinner	Underground	Fitzroy CDCM
Peter Stigwood	Underground	Fitzroy CDCM
Brent Stewart	Surface	QMRS
Martin Watkinson	Surface	SIMTARS
Shaun Dando	QMRS Dysart Station	Anglo Grosvenor Mine
Geoff Nugent	Surface	RSHQ

Figure 5 Assessors QMRS event

Exercise initiation

The QMRS emergency number - 1800 QMRS20 - was called by an assessor at 04:58am, the call was answered by two QMRS operations managers. After receiving the information QMRS Operations Managers informed their expected time of arrival would be within 2 hours.

Additionally, the QMRS operations Managers would initiate a team members response to the mine via the 'ALERTS' call out system and contacting mutual assistant mines sites to deploy available mines rescue team members.

The key operational response areas for assessment included.

- QMRS Dysart head office logistics support functions
- QMRS response to CDCM mine site including equipment and team member response, team formation and deployment process.
- QMRS operational activities underground executing defined tasks.

Key findings for each operational response areas are outlined below.

QMRS head office activities

At 0458 hrs a call from Carborough Downs Mine to QMRS to activate personnel to respond to Level 1 emergency at mine. By 0512hrs a QMRS Acting Operations Manager arrived at QMRS Head Office Dysart to commence the response.

At 0525 hrs the QMRS ALERTS call out system was initiated to personal mobile phones received by designated QMRS team members advising of emergency exercise activation to Carborough Downs Mine.

The following positions and roles were carried out at head office during the emergency exercise.

- QMRS Acting Operations Manager – Equipment (Initially QMRS Duty Card 1 - Duty Officer, then handover to QMRS Business Manager. Then took on Duty Card 2 – Emergency Vehicle/Transport driver). On arrival at Carborough Downs took on QMRS DC 3 – Operations Manager

- QMRS Trainer – (QMRS Duty Card 2 – Emergency vehicle/Transport driver)
- QMRS Business Manager – took over QMRS DC 1 – Duty Officer@ 0535 hrs plus QMRS DC 6 Head Office/CEO
- QMRS Administration officer – QMRS DC 7.1
- QMRS Executive Assistant – QMRS DC 7, then stood down for N/S coverage
- QMRS Operations Manager - Mine Inertisation
- QMRS Trainer – arrived Dysart, stood down for N/S coverage
- QMRS Equipment Technician – travelled to Carborough Downs via Boonal and Dysart
- Offsite – QMRS Acting CEO – available for N/S coverage on site
- Offsite – QMRS Acting General Manager – MEMS Software
- Offsite- QMRS Administration Officer – assist with logistical and administration support
- Offsite – QMRS Operations Manager – Underground Training – available for N/S coverage on site.



Figure 6 QMRS Head office staff conducting logistics support.

What worked well

- Initial ALERTS callout message to activate QMRS staff gave clear instructions, which were easily understood by recipients and allowed an efficient response.
- QMRS Head Office Duty Card holders followed emergency response process and systems thoroughly, systematically, and diligently.
- Teamwork and communications between QMRS Head Office staff with varying levels of experience and knowledge was excellent. All input was considered and valued.
- Experienced QMRS personnel provided good knowledge, experience, and direction during interactions at Head Office to assist team.
- Personnel working from offsite provided additional support that assisted the QMRS response.

Areas for improvement

ALERTS callout system

- Several Mines Rescue team members indicated they had issues with responding to the ALERTS callout, including contacting personnel at Head Office on the designated contact number having missed the initial call, and PIN issues.
- Calls went to message bank at Head Office initially and there was a delay in responding to these.
- A significant amount of time was also spent by QMRS Duty Card holders, determining and confirming exactly which team members were responding, their locations, ETA and whether they had arrived onsite.

Response trailers

- THE QMRS response trailers used could not carry all the equipment required, and one trailer was not fit for purpose.

MEMS process

- Familiarity, experience, and knowledge of QMRS staff with the QMRS emergency response process including the MEMS software tool varied.
- There were some sections of the QMRS emergency response manual that were not up to date e.g., RSHQ contact list.

Communication

Accurate and timely communication of team members responding, and equipment location data could be improved.

Updates to and from the Mine site were limited due to internet accessibility issues.

Visibility of incident data amongst staff members at Head Office operations was limited as only desktop or laptop screens were available.

Communication within Head Office was difficult at times, due to number of phone calls and conversations being carried out at same time.

Fatigue management

- QMRS staff and team member fatigue management were regularly considered during exercise. There was some discussion and varying opinions around what was acceptable in the first 24 -48 hours of an emergency response.

Logistics

- Sourcing transport and accommodation providers for the ongoing response was carried out by QMRS personnel independent to the mine site initially. In an emergency event, utilising a site resource to assist accessing individual mine site service providers may be more efficient.

Team members

- Delays experienced with gathering available team member data directly from mine site control rooms when sourcing team members for an ongoing response.
- Some delays were experienced by team members accessing the mine site due to not having QMRS identification cards on hand.



Figure 7 Mines rescue team equipment trailers departing QMRS Dysart station circa 0555hrs.

QMRS mine site surface activities

The principal elements reviewed by assessors during surface and deployment activities at CDCM included.

- Adequacy of response by QMRS employees and volunteer team (response times and numbers)
- Adequacy of team member equipment e.g., sufficiency of quantity, condition, and deployment.
- Effectiveness of team formation and deployment.
- Application of the QMMRS emergency response system e.g., Duty Cards and the MEM software system.

A timeline of key events prior to deployment of Mines Rescue Teams underground follows below.

Time	Location	Event
0613hrs	CDCM Front gate	<p>First QMRS team member arrived onsite.</p> <ul style="list-style-type: none"> • Team member assigned Duty Card 5 (substation coordinator) • Reviewing DC5 • Filling in Tee Cards • Organising staging area <p>More members arriving through the gate</p>
0654hrs	QMRS Substation	<p>Handover of Duty Card 5 (substation coordinator) to technical support team member.</p> <p>QMRS operations Manager arrives onsite with Response Trailer 2</p>
0657hrs	QMRS Substation	<p>QMRS training officer arrives onsite with the Operational Response Unit trailer.</p> <p>QMRS Operations Manager began applying Duty Card 3– Operations Manager</p>
0700hrs	CDCM Training Room 1	QMRS Operations Manager briefed on scenario by Incident Controller
0732hrs	QMRS Substation	<p>QMRS Training officer took over Duty Card 5 (substation coordinator)</p> <p>Sufficient team members on site to create Team 1</p> <p>Preoperational equipment checks commenced. FAB controller and assistant assigned.</p>
0734hrs	Substation	2 ND QMRS training officer arrives on site
0735hrs	Substation	<p>Team 1 testing suits on the RZ25. Pre op on minimum equipment complete.</p> <p>Team and Operations manager decided to test due to travelling from Dysart station.</p> <p>Trailer 2 RZ25's out of service – out of calibration. (Speaking to QMRS technician it has been calibrated, stickers not replaced)</p>
0751hrs	Substation	<p>Organising substation phone – number #230</p> <p>Assessors Note: Couldn't find the phone number on the phone listing. May pay to display on the phone itself for ease of identification</p>
0806hrs	Substation	<p>Team 1 ready for IMT briefing.</p> <p>Team discussing captain's folder and the search pattern team requirements</p>
0817hrs	Substation	Team 2 ready for IMT Briefing
0817hrs	QMRS Substation	<p>Searching for a site first aid kit for FAB (Sourced from site promptly)</p> <p>QMRS senior trainer arrives on site and assumes Duty Card 5 responsibilities</p>
0817hrs –	CDCM Training Room	IMT briefing for the Mines Rescue teams.

Time	Location	Event
0830hrs	1	Team briefing slightly delayed due to waiting for Team 3 (Standby team). Briefing completed by 0830hrs
0900hrs	QMRS Substation	2 nd QMRS Operations Manager arrived onsite and briefed
0903hrs - 910hrs	QMRS Substation	<p>Team 3 formed commenced preoperational checks on minimum equipment.</p> <p>Teams 1 and 2 performing Captains surface checks on team members.</p> <p>FAB departed surface to set up at 11 -12 CT C heading East Mains</p> <p>Team 1 departed surface for FAB</p> <p>Assessors note: Duty Card 5 not followed correctly. FAB checklist not used while packing for deployment. The checklist was only utilised once FAB was reminded of it.</p> <p>Didn't have a mine PGD as per training.</p> <p>No additional SCSR's for FAB as per training</p> <p>Had the TIC in the back of the drifrunner – was not required and is still UPEE. Was not supposed to go UG (was noticed by QMRS Operations Manager and was not sent UG)</p>
0915hrs	QMRS Substation	Team 3 suit testing on RZ25
0922hrs	QMRS Substation	FAB informed IMT that they are at 11-12CT, C Heading East Mains and setting up FAB
0926hrs	Underground to Substation (IMT)	<p>QMRS team member assumed Duty Card 5</p> <p>FAB established and currently completing briefing with Team 1. Team 2 on standby</p>

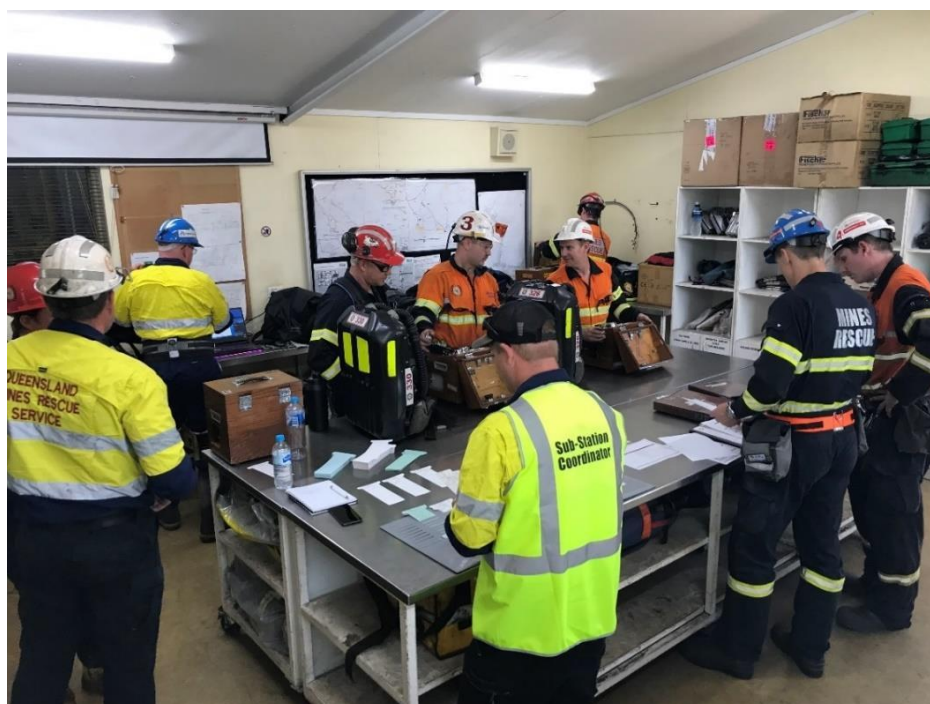


Figure 8 QMRS Substation Resource Management and testing BG4 Breathing apparatus

What worked well

- QMRS Operations Manager organised and ensured that team 1 and 2 were preparing to deploy for the life at risk situation and to deal with the environmental situation once the missing person was located. He made the call early into the exercise which was the correct decision to follow.
- QMRS team members organised for staging areas for preoperational checks. Prior to the teams returning to the surface, they organised the areas for where to strip, dry, rebuild and test BG4 Breathing Apparatus.
- Team captains reviewed and managed their captains' folders coordinating with each other potential issues and solutions, so they were all on the same page. Good planning
- FAB updates to the surface substation and IMT were on time and had adequate detail to keep the surface aware of conditions and what was happening underground.

Areas for improvement

- QMRS access to site - Look at the creation of digital cards for use on mobile phones. Even with training saying cards are required to access site, there is more likelihood of team members having their phone with them than a physical ID card.
- Re familiarisation of team members in the structure of equipment deployment and requirements for testing if devices travel by road to a site. This should be done to validate the equipment is fit for use e.g., testing BG4's on the RZ25 or RZ7000 after travelling in trailers. May have jostled something loose.
- Review staging areas at QMRS Substations for personnel who aren't required in the substation. There was consistent distraction in the substation while trying to communicate with personnel or the FAB underground. There may be the possibility of having a room or covered area where personnel can wait until needed for specific tasks. This is covered in Step 7 of Duty Card 3 – Operations Manager



Figure 9 QMRS equipment response trailers on site

Additional comments

The time for the trailers to reach site has been calculated and tested a number of times in the last 6 months. This includes deployment from both stations and the satellite trailer at Moranbah North. The timeframe for this has been determined to be within the acceptable levels by QMRS.

The process from the inception of the Emergency Response Trailers has been to test the BG4's and any

other equipment required prior to deployment. In an actual emergency the trailers will be onsite at approximately the same time as the QMRS operations Managers. The Manager will then need to be updated on the status of the mine and how the MEMS software is progressing. If that has been completed to the satisfaction of all stakeholders the team tasks, authority to enter, ventilation authority to enter, the QMRS explosibility gas data has been collated, and any QMRS/team withdrawal TARPs have been developed. Only then will the teams be authorised to deploy underground.

QMRS operational activities underground

Sufficient team members responded to the mine to form 3 full mines rescue teams and resource a functional FAB underground.

Two mines rescue teams were deployed to conduct separate tasks described below in the relevant captain's task sheets. Team 3 was on standby for both active teams which complies with the 'QMRS Guidelines for Mines Rescue Operations'.



Figure 10 QMRS mines Rescue briefing prior to deployment underground



Queensland Mines Rescue Service

Captains Task Sheet

Action	Route	Initials
1.	Trainer	
2.	Captain	
3.	File	

Colliery: Carborough Downs	Date: 30/10/2022	Time:	Task Sheet # 1
Team Captain:		QMRS Senior Official: Brent Stewart	
Incident Controller: Mark Bobeldyk		IMT Briefing Official: Mark Bobeldyk	
Current Situation: Unable to enter the mine due gas TARP Elevated gas levels at TB 3, 12CT, Y to X Hdg Missing CMW. Last known location between 13 – 18 CT Z, A or B Hdg. QMRS to assist with tasks as stated below.			
Mission (Objective): Locate missing coal mine worker			
Execution (Strategy & Tasks): Strategy: <ul style="list-style-type: none"> Conduct search of the last known location of the coal mine worker Tasks: <ul style="list-style-type: none"> Conduct a <u>2 heading</u> search from 13CT to 18 CT in A and B Hdgs. Conduct a single heading search from 18CT to 13 CT in Z Hdg. If CMW not found return to FAB for further instruction On completion of tasks recommission all QMRS Equipment to Std. 			
Missing Persons? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, list missing persons			
Name	Lamp/SC SR#	Last Known Location	
J Doff	352/352	13 – 18CT, A, B or Z Hdg.	
Resources Required / Documents / SOP's / JSA's		Location	Check

Figure 11 Mines Rescue Team 1 Task sheet



Queensland Mines Rescue Service

Captains Task Sheet



Action	Route	Initials
1.	Trainer	
2.	Captain	
3.	File	

Colliery: Carborough Downs	Date: 30/10/2022	Time:	Task Sheet # 1
Team Captain:		QMRS Senior Official: Brent Stewart	
Incident Controller: Mark Bobeldyk		IMT Briefing Official: Mark Bobeldyk	
Current Situation: Unable to enter the mine due gas <u>TARP</u> Elevated gas levels at TB 3, 12CT, Y to X <u>Hdg</u> Missing CMW. Last known location between 13 – 18 CT Z, A or B <u>Hdg</u> . QMRS to assist with tasks as stated below.			
Mission (Objective): <ul style="list-style-type: none"> Investigate source of elevated CO and gather data for confirmation of current gas <u>results</u> 			
Execution (Strategy & Tasks): Strategy: <ul style="list-style-type: none"> Conduct seal inspections and gather bag samples as per the attached <u>plan</u> Tasks: <ul style="list-style-type: none"> Conduct seal inspections from 6A CT to 10 CT, Y to X <u>Hdg</u> East Mains Seal bag sample to be collected from 10CT, Y to X <u>Hdg</u> East Mains General body bag sample to be collected at 16 CT, Y to X <u>Hdg</u> East Mains Conduct seal inspections from 1CT – 2CT E, F and G <u>Hdgs</u>, BP1 Seal bag sample to be collected from 1CT – 2CT G <u>Hdg</u>, BP1 On completion of tasks recommission all QMRS Equipment to Std. 			
Missing Persons? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, list missing persons			
Name	Lamp/SCSR#	Last Known Location	
J Doff – Team 1 conducting search	352/352	13 – 18CT, A, B or Z <u>Hdg</u>	

Figure 12 Mines Rescue Team 2 Task Sheet

What worked well

- Most team members took notes during the briefing.
- Suitable questions were presented to the QMRS Operations Manager by team members during the briefing regarding risk management and team tasks.
- Outstanding teamwork within each team particularly with team members from different mines and varying experience.
- Excellent Leadership demonstrated by team captains and high motivation from all team members.
- FAB controllers had conducted FAB operations particularly communication between active teams and surface to high standard. E.g. timely and accurate communications through to surface – every 15mins or within the time frame.
- Active teams provided accurate and concise communications back to FAB and within the 20min time frame.
- **Excellent urgency showed by teams when to conduct preoperational checks and deploy from FAB.**
- Very evident that the Mines Rescue Team members are well trained and know their positional duties (Captain, V-Capt etc) very well.
- Excellent choice of Team Captains
- All teams executed mines rescue procedures and protocols to a high standard reflecting effective training by QMRS.

Areas for improvement

- During team briefings where a mine plan is presented on a power point screen it would be advisable that a Mine Site person (with the QMRS Operations Manager) delivers the position of the seals, cut-throughs' travel roads, conditions etc as local knowledge is vital.
- Where team captains ask a question about ventilation, and instead of putting this plan back up on the screen so everyone could understand the question and answer, the QMRS Ops Manager went to the individual and showed him on his plan.
- Underground communication equipment for mines rescue teams was not at an acceptable operable standard, this requires urgent attention by QMRS. The status of the underground communication system could compromise the deployment of mines rescue teams
- The establishment of FAB could be more efficient which indicates that training for FAB setup could be improved at day release training.
- There was a level of unfamiliarity by team members when on site with the substation and other mines rescue protocols which may be reflective of insufficient QMRS day release training at mine sites.
- Better local knowledge of the Underground for the Drifrunner drivers who are taking the MR members Underground.



Figure 13 Team 1 Captain confirming team deployment activities with FAB Controller



Figure 14 Active team captain reviewing mine plan and team tasks.

Mine focused event

The mine focused emergency exercise was conducted on Wednesday 23 November 2022 commencing at 10:45am.

Mine operational status

Wednesday 23 November 2022 was the first day shift of a 7-day roster cycle for 'Red' crew and a normal production shift for all production units at the mine.

However, some operational matters presented prior to the commencement of the exercise which required the exclusion of the Longwall (LW)14 and NWM production districts and crews from the emergency exercise to ensure risk was at an acceptable level.

- LW14 experienced a Level 3 Strata TARP trigger requiring remedial action.
- NMW development panel experienced a gas management hazard which also required remedial action.

Scenario

Initiation

The scenario comprised of the following events which initiated triggers for response within the mines SHMS.

- At 1030am a loss of Ergon power supply at the lease boundary substation due to critical asset failure and shedding load instigates a whole of mine site power outage estimated to be 10 hours as notified by Ergon.
- At approximately 1045am in a sealed, partially extracted, board and pillar panel (BP6) a large pillar collapse occurs damaging and breaching two of the three installed seals expelling the goaf environment into the adjacent mine workings.
- 1100am subsequent large falls occurring in BP6 Goaf further damaging adjacent VCDs and further expelling the Goaf environment into the workings impacting the SE Mains development and road header crews inbye BP6 panel.

Assessment of the scenario

Underground assessors

Name	Location	Organisation
Darren Place	South East Mains	Fitzroy Carborough Downs Coal Mine
Carl Sykes	South East Mains	BMA Broadmeadow Mine
Justin Davies	South East Mains	Anglo Aquila Mine
Brett Murphy	South East Mains	Anglo Grosvenor Mine
Tim Lawrence	South East Mains	Anglo Grosvenor Mine
Wade Patterson	South East Mains	Fitzroy Carborough Downs Coal Mine
Nathan Gilbert	North West Mains	Anglo Aquila Mine

Name	Location	Organisation
Trent Niuendorf	North West Mains	BMA Broadmeadow Mine
Dale White	North West Mains	Anglo Aquila Mine
Josh Whatman	North West Mains	BMA Broadmeadow Mine
Carl Skinner	Underground	Fitzroy Carborough Downs Coal Mine

Surface assessors and technical support

Name	Location	Organisation
Peter Stigwood	Surface Operations	Fitzroy Carborough Downs Coal Mine
Scott Dobbie	IMT	Anglo Aquila Mine
David Cliff	IMT	University of Queensland MISHC
Chris Gatley	Control Room	Anglo Head Office
Michelle Bruncker	Control Room/Tag Board	Anglo Grosvenor Mine
Bek Davies	Control Room	
Wade Kathage	IMT Planning	Anglo Aquila Mine
Verity Gannon	IMT Planning	Anglo Aquila Mine
Brent Stewart	IMT Operations	QMRS
Jason O'Connor (QMRS)	IMT Operations	Anglo Moranbah North Mine
Sean Muller	IMT Logistics	Simtars
Peter Verschoor	IMT Logistics	RSHQ
Mark Lydon	Electrical	RSHQ
Jake Gerrard	Electrical	Fitzroy Ironbark
Martin Watkinson	Exercise Coordinator	SIMTARS
Geoff Nugent	Exercise Coordinator	RSHQ

Underground assessments

SEM incident site road-header crew and single pass miner crew

Assessors: Darren Place, Carl Sykes, Justin Davies, Brett Murphy, Tim Lawrence, Wade Patterson

Area and scenario description

The SEM area of the mine consists of two production units.

1. The Road-header crew consisting of 6 x CMWs and 1 x ERZC conducting stone drift drivage connecting North East Mains (NEM) to SEM.
2. The continuous miner crew consisted of 8 x CMWs and 1 x ERZC conducting development mining in the SEM coal seam.

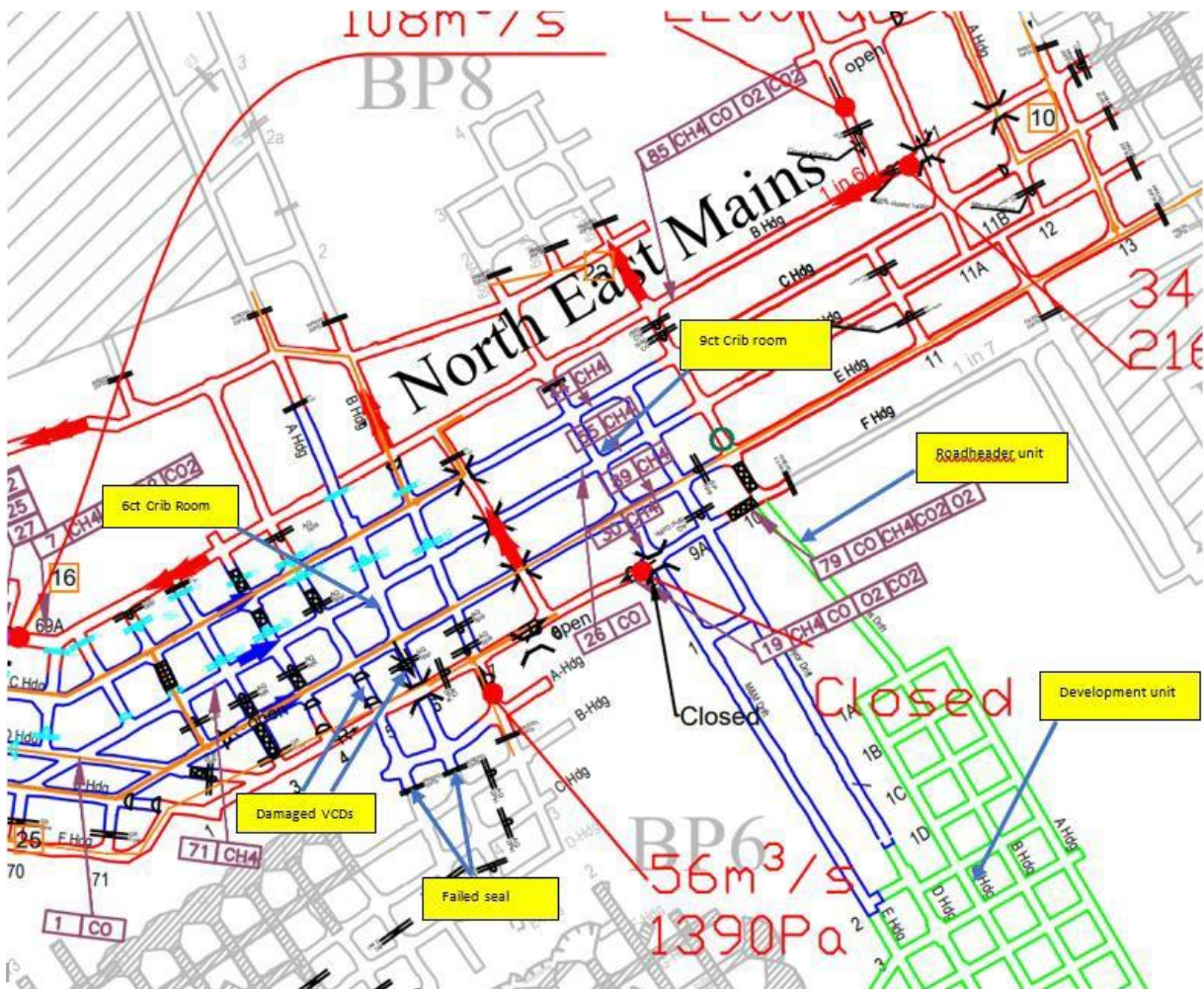


Figure 15 SEM and NEM Panel Layout

The two crews operating in the SEM experienced the primary impacts from the pillar collapse and expulsion of contaminants from BP6 Goaf.

The simulated conditions assessors presented to CMWs, and their possible actions, are outlined below in the assessors SEM exercise guideline.

Time	(Underground Assessors) Condition	Action (North East Mains)
1030 - 1230hrs	<p>1030 hrs Loss of Ergon supply at lease boundary substation – Mine Site power outage estimated 10 hours notification from Ergon due to critical asset failure and shedding load.</p> <p>1045hrs Significant overpressure experienced by CMWs. Significant dust (apply smoke goggles)</p> <p>Gas readings CH₄ OS; CO 0.2ppm; O₂ 13.9%; CO₂ 0.7%</p> <p>All communications are lost to the surface. (Assessor to contact CRO to confirm all CMWs accounted for then go on with exercise)</p> <p>If Deputies are monitoring gas readings after about 5 - 10 mins CH₄ 4.5; CO 0.4ppm; CO₂ 0.5%; O₂ 18%</p> <p>1100hrs 2nd overpressure will occur and impact the CMWs</p> <ul style="list-style-type: none"> • Again, Gas readings increase if PGD is referred to CH₄ OS; CO 0.4ppm; CO₂ 1.5%; O₂ 15.5% • At this time the ERZC of the Road header crew is struck in the face and head by flying debris rendering him unconscious. • The ERZC of the CM Crew has gone missing. (He will remain to maintain district inspection). <p>No Main ventilation until 1300hrs</p> <p>Once fan #6 shaft 2 is running CH₄ 3.8%; CO 0.4ppm; CO₂ 1%; O₂ 17.9%</p>	<p>It is expected an orderly withdrawal as per Mine Ventilation TARP-0152-4 Will commence</p> <p>Assessors will ensure face areas are secure and withdrawal is carried out as per the mines SHMS.</p> <p>CMWs should don SCSRs continue retreat TO Crib room</p> <p>Assessors to monitor the following</p> <p>CMW s should change over to CABA (live CABA station may be used)</p> <p>Treatment of severely injured ERZC (do CMWs carry ERZC or set up and leave behind).</p> <p>Does a CMW utilise the ERZC Personal gas Detector (PGD)</p> <p>Driftrunners will not be able to be used due the CH₄ Concentrations (observe if the CMWs choose to bypass methane monitoring system) Do CMWs attempt bypass with Deputy key.</p>

Time	(Underground Assessors) Condition	Action (North East Mains)
	<p>Egressing from the panel the following conditions will be present.</p> <p>Fresh air commences at 68ct East Mains</p>	<p>Driftrunners unable to be driven past</p> <p>CMWs will need to disembark Driftrunners and walk the remainder of the way or request Driftrunners from the surface.</p> <p>Patient will need to be transported (carried or outbye Drift runner)</p>
	<p>CMWs reach the surface and accounted for on tag board</p>	<p>CMWs may receive debrief (assessors to attend)</p> <p>IF CMWs are allocated tasks for the response assessors should monitor activities and record.</p>
	<p>At approximately 1300hrs Main fan 6 on Shaft #2 will start.</p> <p>The fan will adequately ventilate the NWM including the LW14</p> <p>However East Mains and SE Mains will have limited ventilation not allowing environmental readings to return to acceptable levels.</p> <p>The IMT may choose to utilise the UG CMWs to return underground to conduct remedial activities.</p>	<p>Assessors should remain with evacuated CMWs and accompany them to any activity they may be deployed to</p>

Figure 16 SEM Assessors exercise guideline

Activities and decision-making being reviewed by assessors included.

- Response to environmental change from overpressure events and effectiveness of donning SCSRs and changeover to CABA.
- Recognition of methane hazard and consideration of ignition source risk, particularly from overriding and starting drift runners.
- Method of self-escape. i.e., Vehicle or on foot, Individually or as a group.
- First aid response and assisted escape tactics for incapacitated ERZC
- CMW decision making regarding ERZC unaccounted for at crib room.
- CMW actions in the absence of ERZCs i.e., Do any CMW step up to leadership role and monitoring

of the atmosphere in the absence of ERZCs.

- Effectiveness of communication and information transfer with the CRO while self-escaping.

Scenario response

At approximately 1040hrs both crews were informed of the main fan failure by assessors.

The Road-header crew at the commencement of the exercise were conducting maintenance and roadworks activities, with the 6 CMWs near each other, however the crew ERZC was elsewhere in the district carrying out a statutory inspection.

For purpose of the exercise and to maintain statutory compliance in both districts the Road-header ERZC remained unaccounted for throughout the exercise.

While the Road-header crew was preparing to retreat to their crib room (9ct) they were informed of the 1st overpressure event. The CMWs were provided with 'smoke goggles' to simulate poor visibility from significant airborne dust.

The CMWs effectively donned their SCSRs and travelled single file using a buddy system, with one CMW holding the rib as a guide into the 9ct crib room.

The group then travelled onto the 6ct crib room where the CABA change over station for the SEM is located.

During the SCSR to CABA change over assessor noted the following observations:

1055hrs (Roadheader)	6ct Cribroom	- Performed change over from SCSR to CABA	- Crew were rushing the changeover/panicked - Attempted to start the SMV, attempted to call CRO - They cleaned the area once changeover was completed - During changeover CMWs headstraps become twisted, - CMW took off the CABA and changed it to a new CABA
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Figure 17 CABA being placed on injured CMW

The Continuous miner crew were positioned at the face when informed by assessors of the loss of main ventilation, the crew included 7 CMWs and 1 ERZC, and an Electrician.

As per the mines SHMS the ERZC accounted for all CMWs at the face and contacted the CRO for a status update. The ERZC then instructed the CMWs to return to the Crib Room in the Driftrunner.

Prior to departing in the Driftrunner the crew were presented with the 1st overpressure event. The CMWs were also provided with 'smoke goggles' to simulate poor visibility from significant airborne dust.

All CMWs effectively donned SCSRs and commenced egress to the 6ct Crib Room using the buddy system. The ERZC led the crew and physically counted the CMWs in his crew accounting for all.

An attempt to contact the CRO was made but communications were severed with the surface, the ERZC again verified all CMWs were accounted for.

The ERZC and CMWs travelled via the belt road NEM 9ct E heading to 6ct Crib Room.

At 1105hrs the continuous miner crew arrived at the 6ct crib room along with the Road-header crew commencing the SCSR to CABA change-over process

During the SCSR to CABA change-over process the 2nd overpressure event occurred resulting in debris striking the ERZC causing a head injury. Assessors made the following observations.

1055hrs (Single Pass)	9ct E Hdg	<ul style="list-style-type: none"> - Travelled under belt along secondary escapeway, issues getting the lifeline, lifeline was secured with hooks in high areas making it difficult to get down 	<ul style="list-style-type: none"> - Deputy checking gas levels when egressing
1105hrs	6ct Cribroom	<ul style="list-style-type: none"> - Single pass crew arrived at <u>cribroom</u> - Second overpressure event happened, and the Single Pass Deputy sustained a laceration to his head and was unconscious 	<ul style="list-style-type: none"> - Deputy began to hand CABAs - Electrician pushed through and took control of administering first aid to the Deputy - They did not remove the Deputy to allow ease of access in administering the First Aid. CMWs were standing around bunch - CMW took down vitals of the patient, hooked up CABA to the patient, loaded him into a stretcher and attempted to load him in to the SMV

Once it was determined the Driftrunners were unable to be started due to Methane levels both crews egressed on foot via the primary escapeway. The following observations were made by assessors.

1115hrs	6ct Cribroom	<ul style="list-style-type: none"> - CMW took the Deputies PGD and asked for the gas readings 	<ul style="list-style-type: none"> - 2 x additional CABA were taken from the cache - Commenced carrying the injured Deputy outbye
1120hrs	Tagboard	<ul style="list-style-type: none"> - Accounted for persons at the tagboard 	<ul style="list-style-type: none"> - <u>Realised that Roadheader</u> Deputy was missing - A discussion was had to split up the crews, one crew continue carrying stretcher and the other go back and search for the missing Deputy - Decision was made to continue carrying injured Deputy out of the mine as a group - SMV arrived in panel with 3 x white hats and 1 x yellow hat to respond although as per the scenario there was off scale methane present. CMWs instructed to turn the SMV off and stay there

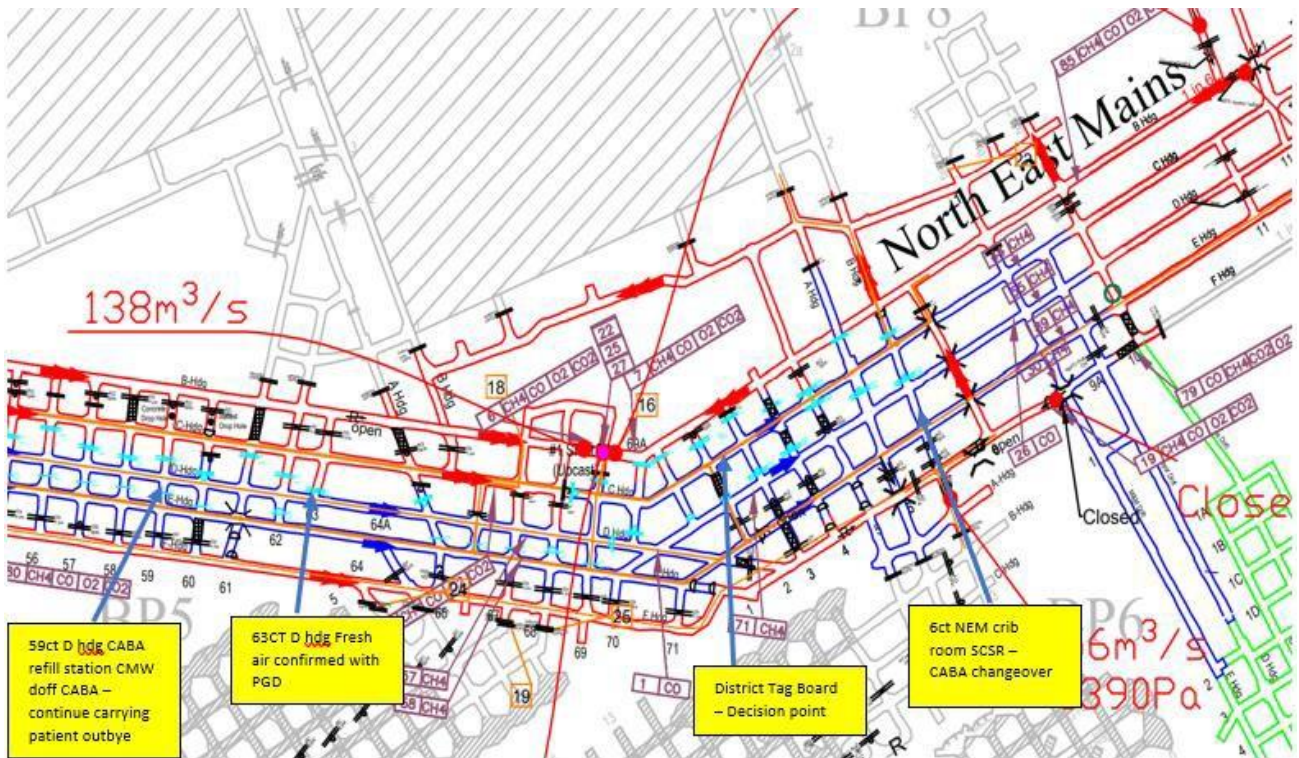


Figure 18 SEM CMW self and assisted escape progression

Both crews of CMWs Continued travelling outbye via the primary escapeway in D heading with a CMW continually monitoring the atmosphere with the ERZCs PGD.

Fresh air was identified at 63ct D heading, the group continued onto 59ct CABA refill station where fresh air was also confirmed. The following observations were made by assessors.

1125hrs	63ct	<ul style="list-style-type: none"> - Conducted a head count - Checked the gas environment 	<ul style="list-style-type: none"> - 20.3% oxygen was given with minimal other contaminants, all but 3 of the 16 CMWs chose to doff their CABA suits - Once this happened, leadership was taken of the situation by the Electrician
1130hrs	59ct Refill station	<ul style="list-style-type: none"> - Accounted for all persons - Grabbed water and hydrated 	<ul style="list-style-type: none"> - 15 of the 16 CMWs doffed their suits and 1 remained on CABA - The patient was still under CABA at this stage - CMW was at the front monitoring for gas from this point the whole way out ensuring respirable atmosphere

The 16 CMWs continued travelling outbye rotating the stretcher carrying duty to manage physical fatigue. Attempts to contact the CRO were made at each available phone whilst travelling outbye. Communications with the CRO was achieved at 37ct D heading Telephone (#512).

The following observations were made by assessors.

1150hrs	37ct Refill	<ul style="list-style-type: none"> - Comms returned, dialed the CRO - There were 3 separate phone calls made through to the CRO: <ol style="list-style-type: none"> 1. Number of CMWs and intent to continue egressing 2. That they were in known fresh air due to the PGD and gave the PGD readings to control room as per laminated sheet for 61ct 3. Injured CMW that they were <u>stretching out</u> 	<ul style="list-style-type: none"> - Information given was 16 CMWs egressing from Carb South, went through their plan to escape - <i>No mention of the missing Deputy in Carb South during update to CRO</i> - Discussion was had about leaving injured CMW hooked up to the refill station. Decision was made to continue egressing from the mine - Discussion was had about splitting the crew, half continuing egressing with the injured CMW and half going back and trying to locate the missing CMW - CMWs had a discussion around why the surface could not send an SMV to pick them up considering it was fresh air
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Figure 19 CMW communicating status of escaping CMWs to the control room.

Once more the 16 CMWs continued travelling outbye carrying the patient moving to C heading East Mains and contacting the CRO at each communication point to update the group and patients' status.

At 18ct C heading the SEM group encountered the underground ambulance carrying an injured patient from North East Mains (NEM) MG14a development and the following NEM crew observations were made by the assessors.

1215hrs	C Hdg 18ct	<ul style="list-style-type: none"> - Ambulance (MPT002) arrived from MG14A with an injured CMW - Ambulance left with injured Deputy, 6 x CMWs (4 x Carb South, 2 x MG14A and injured Deputy) 	<ul style="list-style-type: none"> - The decision was made to swap patients in the ambulance and take out the injured Deputy due to more severe injuries - The CMW who initially administered the first aid to the Deputy went out of the mine in the SMV with the injured patient
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The remaining CMWs from both NEM and SEM continued walking until they reached the surface tag board opposite the Control room.

1220hrs	14ct Refill station	- Counted CMWs that remained after the ambulance left with injured Deputy	- Updated CRO with: <ul style="list-style-type: none"> • 6 persons from MG14A • Persons who left in SMV with injured CMW • Location and the fact they changed over injured person and the reasoning (more severe injury) • Informed that there were 17 in total egressing including 1 x CMW in stretcher with suspected broken leg • Time that the SMV left with injured CMW
1235hrs	Pit bottom (bottom of drift)	- Reached the bottom of the drift with MPT002 arrived to transport the CMW with broken leg to surface	- Loaded casualty into the SMV - Informed the SMV driver of the missing Deputy in Carb South that was accounted for - 5 x CMWs left in the SMV plus the injured CMW leaving 11 x CMWs underground to continue egressing - Updated CRO with: <ul style="list-style-type: none"> • Second CMW loaded into ambulance with 5 x CMWs • 11 x CMWs continuing to egress out of the mine • Is there any available SMVs to assist with removing persons
1245hrs	Surface portal	- Arrived on the surface, no portal sentry in place	
1255hrs	Surface tagboard	- Walked to the surface tagboard from the portal	- Tagboard attendant monitoring persons when coming out and ticking off - CRO asked Carb South persons for information on missing CMW

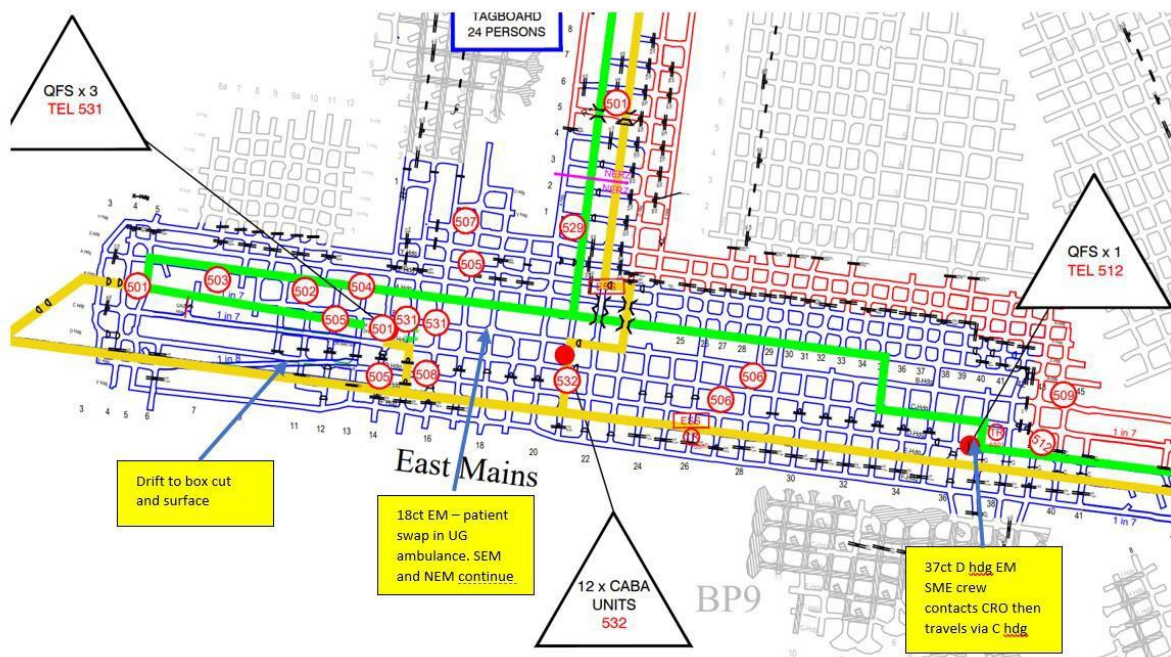


Figure 20 SEM and NEM self and aided escape progression

What worked well

- During low visibility the crews used the buddy system well, stopping regularly and accounting for all CMWs. At one stage the ERZC miscounted so conducted a recount to ensure that no one was missed.
- When entering the secondary Egress, the CMWs followed the lifeline.
- The Roadheader crew arrived at the crib room cache to perform their changeovers first, after completing their changeovers the CMWs cleaned the area of obstructions.
- The Miner Driver had a PGD and another CMW took the injured ERZC's PGD and used it to monitor

concentrations during the egress.

- During the communication process, the crew used 1 point of call for communicating to the CRO.
- During the egress, 1 x CMW was at the front of the pack and they were constantly monitoring the mine environment for changes in gas levels. This made it easy to identify the changes in the mine atmosphere at 68ct and 61ct.
- In areas of no communication, a CMW was writing the following information on the statutory inspection board.
- Number of CMWs egressing.
- Condition of CMWs.
- Missing CMW still in the Carb South district.
- Conducted welfare checks on the casualty once in known fresh air and masks were removed.
- Attempted to refill at each station when in irrespirable atmosphere.
- Once the ambulance did arrive, the crew identified the difference in severity of the injured and swapped out the CMW with the broken leg from MG14A with the injured ERZC with head injuries from Carb South. Also the CMW who administered First Aid also went out with the patient and was able to provide information on the CMWs treatment, vital signs etc to the Paramedic.

Areas for improvement

- The changeover process from SCSR to CABA requires refining, 1 x CMW twisted their straps and instead of taking off and fixing went and grabbed another CABA and donned it.
- When the ERZC was injured because of the second overpressure event, he was placed down next to the CABA station. This area became highly congested, and no one thought to drag the injured CMW into an area where there was more space to treat.
- It was evident that CMWs were not taking their CABA from storage and removing themselves to an area where they had adequate room to don their CABA. Persons were also reluctant to assist the injured, only 4x CMWs began to administer first aid.
- Before leaving the cache, no one did a pressure check or did a count to verify that all persons were accounted for, initially no one tried to call CRO or establish comms with the surface to alert them of the event.
- Both crews at separate times attempted to start the SMVs to egress out of the mine.
- No one really took on a leadership role until the CABAs were doffed. Once the CABAs were doffed and the CMWs had the ability to talk, the Electrician in the crew took on a leadership role and gave clear and concise instructions.
- When communicating to CRO there was a disconnect with the information that was spoken about to what was communicated to the CRO. When the crew regained communication with the CRO at 37ct, it was said numerous times about the missing CMW in Carb South however this was not communicated to the CRO until the final ambulance trip from pit bottom.
- When at the tagboard in Carb South district, an SMV arrived with 3 x white hat CMWs and 1 x yellow hat. They were told to turn their SMV off and stay there as they drove into an off-scale methane atmosphere as per the scenario.

NWM MG14a development

Assessors: Nathan Gilbert, Trent Nuendorf, Dale White, Josh Whatman

Due to operational matters presenting prior to the commencement of the exercise the exclusion of LW14 and NWM production districts and crews from the emergency exercise was required to ensure risk was at an acceptable level at the mine.

- LW14 experienced a Level 3 Strata TARP trigger requiring remedial action.
- NWM development panel experienced a gas management hazard which also required remedial action.

This left LW 14a Development the only crew from the NWM area of the mine to participate in the emergency exercise.

Area and scenario description

The LW14a Development area of the mine consists of a single continuous miner unit consisting of 6 x CMWs and 1 x ERZC.

The NWM's Crew undertook the withdrawal from the mine as per their normal process for loss of mains ventilation. The use of SCSRs were not required by the crew.

However, the crew were presented with one of their team seriously injuring their leg and requiring assistance to withdraw safely from the mine.

The ERZC contacted the control room and informed the CRO of injury severity and that crew would contact control room from Crib room prior to evacuating to the surface.

At the crib room the ERZC again contacts the control room and informs CRO of status of Injured CMW, all CMW in Crew accounted for, Man transporter fully loaded and two CMW's travelling on foot.

The crew provided a good standard of first aid to the injured CMW and the entire commenced crew egress from the panel crib room.

At North Mains B heading 21 -22ct the drivable intake roads reduce from two to one. At this location a broken-down Loader was installed into the scenario for the crew to either abandoned their vehicle and carry the patient out of the mine or attempt to restart the Loader and continue by vehicle.

The crew successfully restarted the loader and continued to egress out of the mine.

At pit bottom in East Mains both the NEM and SEM crew encountered each other. Communication between the team leaders determined that the injured ERZC from SEM would be prioritised and swapped into the Driftrunner for the CMW with the injured leg, to be transported immediately to surface for medical treatment.

All CMWs from each district egressed the mine up the drift and box cut on foot to the surface administration.

Surface assessments

Carborough Downs Coal Mine (CDCM) applies a typical Mine Event Management System (MEMS) structure for managing emergencies at the mine.

Further, CDCM had recently implemented the QMRS software tool, to enhance the IMT process and information management flow. This is the first time the CDCM has used the MEMS software tool.

Carborough Downs Coal Mine emergency response framework

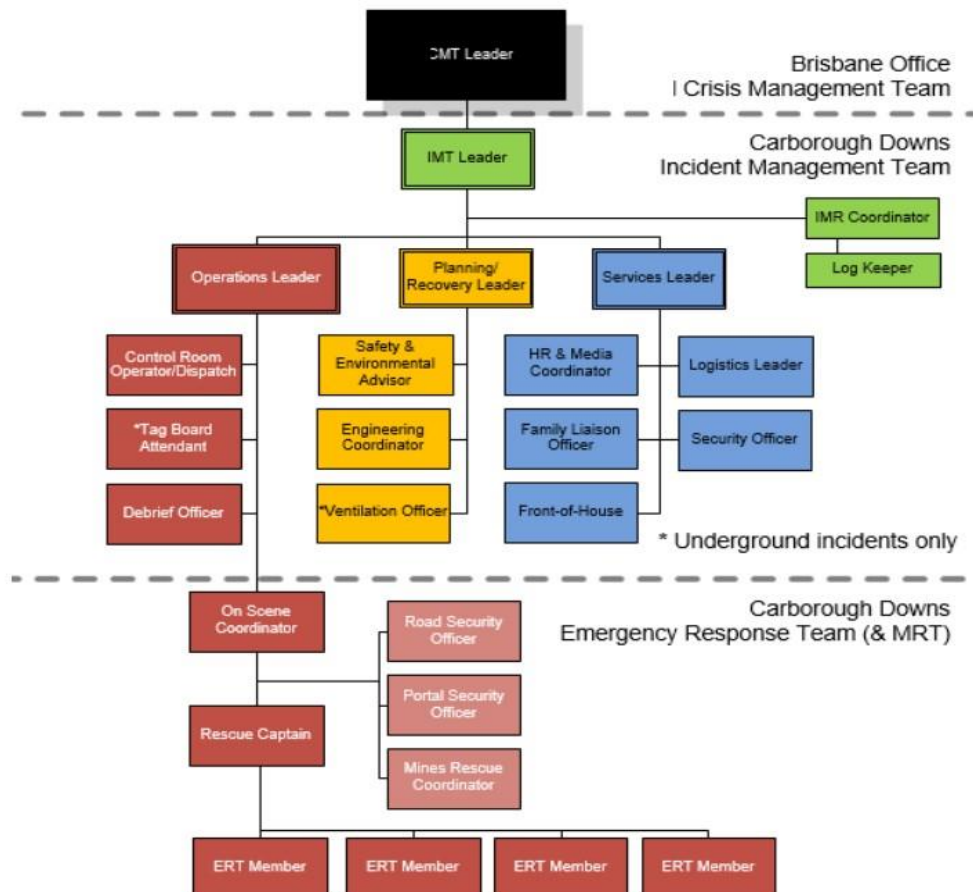


Figure 22 CDCM IMT Structure

Surface assessment locations

Assessors were placed in various locations on the surface to monitor the response to the incident. These locations varied as the response to the incident developed. Assessors observed the response from the following locations/functions:

- Control room
- Incident Management Team (IMT)
- Operations team
- Planning team

- Logistics team
- Queensland Mines Rescue Service (QMRS).

The following outlines the surface response during the exercise.

Control room and tag board

Assessor: Rebeca (Bek) Davies, Christopher Gately, Michelle Bruncker, Aaron Chong, Sean Muller and Martin Watkinson.

The commencement of the exercise was delayed by the reporting of a methane exceedance in the NWM production area, this was reported to the exercise Chair in his function as a mines inspector as a high potential incident (HPI).

The expected gas readings from the scenario were identified using the mine ventilation model with no fans running, the predicted ventilation flows with only one fan running and gas data from the failed seal area. The mine had a fan stoppage approximately two weeks before the exercise and there were areas in the NWM when the methane built up over 2.5%. this was replicated in the scenario.

The mine gas monitoring system is managed by the Safegas system (Simtars software). Simtars developed a training tool call Safesim which replicates the mine site gas monitoring system and enables different scenarios to be played in real time along with anticipated gas levels and alarm as would be seen on the individual mine system.

The Safesim computers were set up in parallel to the mine control room computers to ensure that normal mine site gas monitoring was not interrupted. The system was also integrated into the site intranet enabling access to the dummy Safesim data in the planning and operational areas as well as the IMT room. The functionality of the Safesim data is the same as the normal Safegas system including password logins, location names and trending data.

Once the HPI had been dealt with, the scenario was played out with the fan stoppages and the expected build-up of methane in the NWM.

This section of the report covers the activities observed in the control room, the tag board area and interactions with IMT.

What worked well

- CRO used and followed TARPs, procedures, and available resource material
- CRO & Trainee CRO worked very well together, they worked out very quickly who was doing what and CRO was giving guidance to the Trainee CRO. The Trainee CRO asked questions when he was unsure. Great teamwork
- CRO's used good communication with the DAC, radios & phones
- CRO's stayed calm while talking to CMW's trying to withdraw from the mine
- CRO highly skilled with Safegas, RT & Tube Bundle
- CRO highly skilled with Tube Bundle and Gas Chromatograph and interpreting and understanding results
- Enacted emergency protocols including emergency siren, ambulance etc
- Good communication between the CRO, VO & UMM

- Good use of Northern Lights (this really could have been used from the start of the exercise).

Areas for improvement

- Clear objective from the IMT team
- Communication from the IMT team to the Control Room, no updates from IMT to CRO
- CRO's need to have a system to track the evacuation of the mine, use the tracking tools available (if they had a white board or something they could have had a visual way to track each work group and the tag board attendant would be able to refer to it)
- Lack of information collected from UG, names, detailed description of surroundings, is anyone missing etc
- Lack of urgency for the missing ERZC, after CRO notified IMT and asked for instructions there wasn't any from the IMT
- Pressure alarms not recorded and not reported
- Handwriting of gas readings is unrealistic in a real emergency and may result in human error, an electronic system is a more efficient method of recording alarms
- No debrief from the IMT to the CRO
- Handover between the D/S and N/S CRO very informal, no clear objective or information to hand to oncoming CRO.

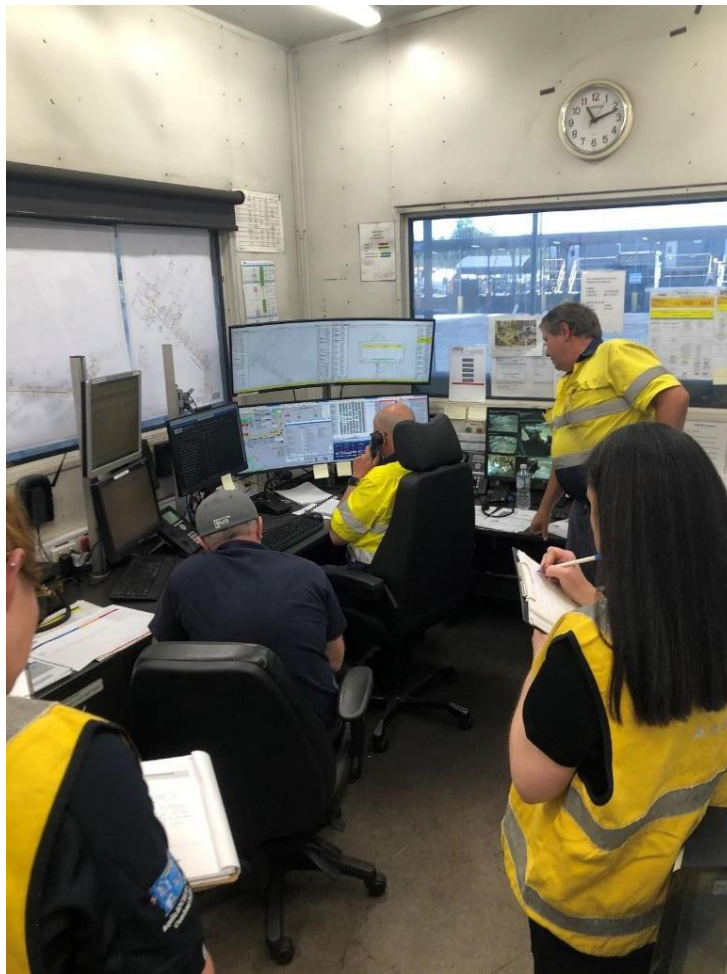


Figure 23 CRO's and Ventilation Officer reviewing information and data in the control room

Incident management process

Assessors: David Cliff, Scott Dobie, Ben Giles, Peter Verschoor, Brent Stewart, Jason O'Connor, Wade Kathage and Verity Gannon.

CDCM use the QMRS mine event management system (MEMS) for managing the mine site emergency response. This is a computerised system that provides data drive support for crisis management and assists in building operational resilience.

The operational structure around the emergency response is based on the Australasian Inter-service Incident Management System (AIIMS).

The Incident management team splits into operational groups with dedicated focus, Planning, Operations, Logistics and intelligence cell. The intelligence cell is not a normal part of mine site emergency response; however, it has been reported in several level 1 reports and again at CDMC that critical information is not getting to the IMT or into the MEMS software tool.

The reports for the Incident management process groups have been summarised in this section of the report.



Figure 24 IMT reviewing mine plan

What worked well

- The IMT controller remained calm during all the day's events, as well as remaining mobile between IMT's to validate information and talk directly to specific people.
- All the sub-rooms were laid out with white board and computer access point and well resourced.
- IMT remained structured in terms of the flow – regular brief meetings were held to monitor progress and make decisions about actions.
- The process checker was a good offsideer for the IMT controller to ensure key issues were

understood and team remained focused on objectives – the role of process checker was very effective in ensuring that personnel knew what they had to do, and the key actions were undertaken – not a formal part of IM process

- UMM when joining the IMT provided some good energy around prioritising starting fans to assist with locating missing ERZC.
- Objectives reviewed every meeting.
- Workforce well allocated to a large room and were briefed on several occasions.
- Site locked down very quickly and social media stance was communicated early.
- Information recording (MEMs) including getting people to slow down when providing information and repeating when information was not captured to ensure it was accurately recorded.

Areas for improvement

- There was only 15 minutes between the first and second IMT meeting. This was insufficient time for the sub-teams to form and perform any tasks.
- Some personnel in IMT that didn't have vests – could see what benefit they were providing but maybe should include into duty card if there is a need for the role.
- Some people were talking too fast in IMT, and scribes couldn't keep up and potentially didn't record all the information.
- Nick names were used in some of the sub-team process areas. This can create issues later when new team members arrive or on handover if the team is not familiar with the name.
- No security at IMT and personnel interrupted the meeting – personnel walking in passing on paperwork x 2, phones ringing during meeting, multiple discussions at the same time while IMT running (on some occasions), CRO interruptions.
- CRO had a direct link into IMT through teams on a laptop and would give updates while the IMT was running – this was disruptive of the IMT process – could be handled electronically via MEMS in the form of a dedicated intelligence cell based in the control room area.
- Didn't get much detail from the ug personnel debriefs – especially when trying to understand where the missing CMW was last seen, and any observations on the way out with respect to seals/ventilation devices, at 5pm IMT first time tabled that the CMW was injured due to being knocked over after a wind blast (would have been beneficial to know this information earlier). The debrief process was ineffective and not managed systematically.
- Didn't fill out site white board completely to capture event information (Status & Objectives boards).
- Didn't have a designated room allocated for EAP service – should be designated as a part of the IMT structure/process.
- When UMM was back in the picture (post HPI) not sure about his role as he came and went from the IMT.
- No real discussion around rib fall that injured CMW until late in the day.
- Play on words but objective was to 'Recover' lost CMW when it should have said 'Rescue' (implies CMW is dead).

- Multiple systems and documents to keep updated. IC was receiving phone calls from the Crisis Management Team (CMT) and CMT site representative asking to give them updates – he ended up giving direction in IMT for scribe to contact and provide updates – consider teams to allow CMT to gather information live.
- Took a long time to understand the nature of the injuries of the CMW's (x2 who went to hospital).
- Pressure bumps weren't interrogated until late in the event.
- MEMS system was not fully utilised – no real evidence of detailed Incident Action Plans – would have obviated the need for the corporate office to request updates if MEMS kept up to date in appropriate level of detail.
- No use was made of the SAFEGAS terminal in the IMT room to monitor gas concentrations – relied upon updates from Planning.
- It would have helped the escape and rescue plan to have a mine plan marked up with the areas of fresh air and areas of contamination.



Figure 25 Planning group reviewing data (MEMS software on TV screen)

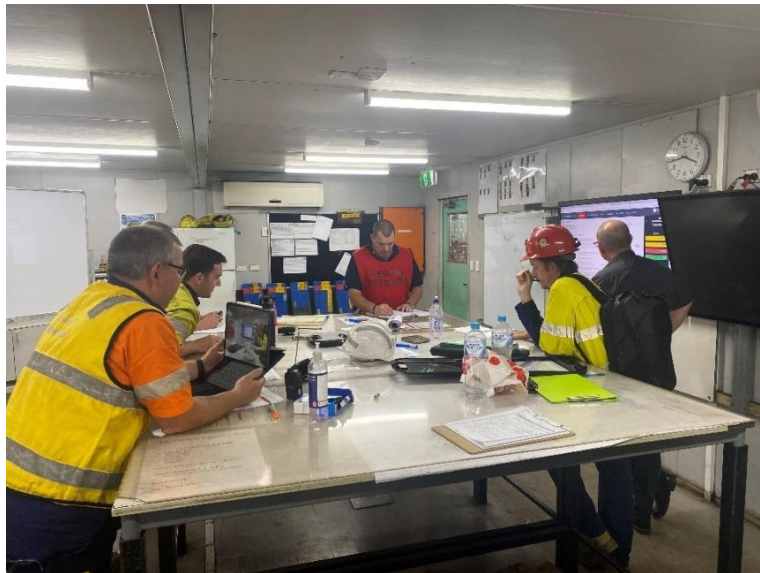


Figure 26 Operations Group meeting

Conclusions

The conducting of two separate events for improved testing of CDCM and QMRS emergency management systems was successful.

Although the new format generated a much larger workload for the organising committee the results from each event confirmed the merit to conduct exercises which allows both a mine and QMRS to focus on their emergency management systems.

The QMRS focused event verified the overall effectiveness of QMRS emergency response capability. However, as anticipated, areas for improvement were identified throughout the QMRS emergency response process.

The assessor's scope for review of QMRS entire emergency response process at this year's event has not been achieved at any previous Level 1 emergency exercise.

A step change for the QMRS focused event in 2023 will require QMRS Operations Managers to apply the complete MEMS re-entry risk management process including development and delivery of deployment documents for Mines Rescue teams. This also has not yet been conducted at previous Level 1 emergency exercise.

Although operational issues precluded parts of the underground mine from participating in the Mine focused event the response to the underground scenario by the SEM crews was commendable.

The demonstration of leadership by individuals and teamwork by each crew member to self-escape and extract the injured ERZC was outstanding.

The response by these CMWs was reflective of the standard and type of training provided by the Emergency Response Coordinator at CDCM i.e., substantial practical training underground.

The surface Incident Management Team functional areas were promptly and proficiently established. The Incident Controller set clear objectives for all functional teams and the IMT process was executed to a good standard throughout the exercise.

Reflective of previous level 1 emergency exercises efficiency in identifying and collating the relevant data and information for effective decision making and risk management could be further improved.

At the time of the mine focused exercise the MEMS software system was being implemented at CDCM. It was commendable the IMT, and all functional areas applied the system throughout the exercise providing numerous learnings for CDCM and QMRS for both application and functionality of MEMS.

Finally, this Level 1 emergency exercise (like previous exercises) emphasised the need for industry to re-evaluate the aided escape strategies employed by the underground coal mining industry.

All recommendations

Recommendations for Queensland Mines Rescue service

25.1 QMRS head office

- a. QMRS to review current callout and communication process to determine improvement opportunities and identify actions necessary to provide a more efficient and accurate system. Consider systems in use by other emergency response organisations.
- b. QMRS to review and determine safest and most effective strategy, equipment and process for deploying equipment to mine sites in emergencies. Consider what is to be transported, where from, how this will be done and by whom, training requirements, communication, contingency options and expectations.
- c. QMRS to review existing incident control duty card system and structure for opportunities to further align with the MEMS process.
- d. QMRS to review the training, familiarisation and testing of the QMRS emergency response process for managing and responding to emergencies, including the MEMS process and software.
- e. Review schedule to increase exposure of all staff to regular emergency response exercises, including, desktop and practical exercises in addition to the Level 1 exercises,
- f. Consider all potential emergency situations and include all levels of the business who may be involved in a real event.
- g. QMRS to review offices or locations most likely to be used to coordinate an emergency response or incident i.e., QMRS Incident control room, to determine suitability and any improvement opportunities. Consider appropriate functional layout, equipment requirements such as large electronic screens and whiteboards, MEMS incident data visibility.
- h. QMRS to review and identify systems to improve communication between QMRS personnel at multiple locations- for tracking actions, requests, information, updates.
- i. QMRS to review fatigue management risk assessment and policy to determine if any improvement opportunities or where clarification is necessary, especially for the early stages of an ongoing incident response
- j. QMRS to have access to Helicopter pad coordinates for each mine and understand process if arranging transfer of essential personnel to site in an emergency.
- k. QMRS to consider if each mine sites logistics functions may be able to assist in an emergency event, and what is expectation of QMRS when requiring services such as transport, accommodation, meals etc.
- l. QMRS to review process for gathering accurate team member availability data from each mine site or team members to determine what is most efficient. i.e., verbal, email, other systems?
- m. QMRS and Mines Rescue Coordinators to communicate to all team members, the expectations on what identification and personal equipment is required as a minimum to access mine sites in an emergency, planned response or training.
- n. QMRS to review schedule and frequency for updating of emergency response manual contact lists.

- o. QMRS consider options to improve communications such as headsets and microphones for office personnel.

25.2 QMRS operations

- a. Internet connectivity for deployments – QMRS review options are available to support QMRS staff in areas of poor internet and telephone connectivity at a mine site. Reliable internet connectivity is crucial for application of the MEMS software used to apply QMRS emergency management system.
- b. QMRS to consult with Underground Mines to ensure Substation plan and layout for deployments and overhaul is sufficient to ensure effective and efficient management and control of equipment and teams for the entire scope of QMRS activities.
- c. QMRS to review and improve effectiveness of team member identification system for access to mine sites during an emergency. (Multiple instances where team members were delayed at the gate affecting team member resourcing)
- d. QMRS to review the suitability of existing emergency response trailers to ensure the security and potential impact to operational readiness for emergency response equipment during transport.
- e. QMRS to review the operational capability of the underground communication system to ensure effective deployment in an emergency.
- f. QMRS to consult with underground mine operators to conduct training of mines rescue team member at mine sites to ensure competence is maintained in substation management and application of mines rescue procedures and protocols in an underground environment.
- g. QMRS review the equipment maintenance system to ensure that all emergency response equipment is always in calibration.
- h. QMRS to provide all SSEs at Underground coal mines the QMRS SHMS to be applied at the mine.

25.3 QMRS MEMS software

- a. QMRS investigate matters relating to the stability of the MEMS software. The software used in the IMT became inactive a few times during the day.
- b. QMRS to review the functionality of the MEMS software system i.e., the flexibility to filter incident questions easily when an incident cause changes from unknown to known.

Recommendations for CDCM and industry

25.4 *Surface incident management key recommendations*

- a. Effective debrief of CMWs - All emergency response systems should have a well prepared debrief process with pre-prepared questions to ensure systematic gathering of relevant technical data and information including operability and reliability of critical systems.
- b. This process should be led by a person with underground knowledge to ensure that key information is obtained then quickly made available to IMT. This could be a sub-responsibility of the small, dedicated intelligence cell. See appendix 4 as an example of an effective debrief tool.
- c. Control Room Intelligence hub - All mines should review the purpose and resourcing requirements for the control room to operate as an effective intelligence hub including the obtaining, recording and efficient dissemination of information to the IMT and functional areas. As an example, the control room would be resourced with 4 personnel:
 - i. 2x CRO (1x communications only between underground and external, 1x monitoring and responding to all monitoring systems),
 - ii. 1x scribe inputting information into a live emergency management software tool for immediate dissemination to IMT,
 - iii. 1x intelligence hub coordinator (this person should have good knowledge of underground operations and appropriate technical competencies e.g., a statutory official to interpret information prioritise information and provide advice)
- d. Post incident risk management – All mines should review the method and efficiency for the systematic gathering of relevant technical data and information including operability and reliability of critical systems to support effective decision making.

**Note: the information and data requirements to determine the acceptability of risk to re-enter a mine during or after an incident are the same for determining if people can remain in a mine to respond to the incident e.g., in seam response activities.*

25.5 *Surface incident management additional recommendations*

- a. Let corporate personnel teams into IMT/access the MEMS (or other emergency management software) and sit on silent in the background to get live up to date information to save phone calls and prompt data capture.
- b. Mine sites should use their relevant emergency management software for managing all major events at the mine e.g., longwall moves conveyor belt installations. This way personnel become familiar with the software tool and can use it efficiently.
- c. Do not put QMRS standby, better off calling them to site when the situation had some many unknowns – better off looking at the QMRS personnel then looking for them.
- d. Utilise QMRS once they arrive onsite. Incorporate into the IMT (Operations and Planning) to assist with specialist advise for the potential deployment of Mines Rescue team members. They can guide in the completion of the risk management process needed for the approval by the IMT.
- e. Utilise the functionality of emergency management software to brief individuals who are coming to site. If permission given to them, they can review either prior to arrival or when they arrive. Once

reviewed they can come with specific questions and the IMT isn't tied up with someone having to physically brief them. E.g., QMRS, ISHR, Inspectorate, Corporate CMT

25.6 *Underground recommendations for CDCM and industry*

Inseam response

- a. The scope and effectiveness of in seam response should be re-evaluated by industry to ensure risk to CMWs is as low as reasonably achievable considering.
 - iv. Improvements in technology and equipment implemented at underground mines.
 - v. The training developments available within QMRS
 - vi. The association and integration between onsite aided escape and mutual assistance from offsite.
 - vii. Does the current industry aided escape model reflect a modern effective system?

Self-escape

- b. Mines emergency response training schemes should ensure practical, realistic and diverse self-escape training, including scenarios including.
 - viii. CMWs experiencing and understanding the physical limitations of their equipment and themselves.
 - ix. Familiarity with using self-escape equipment in the workplace.
 - x. Knowledge and experience of alternate escape routes and methods of escape.
 - xi. Self-escaping in the absence of team leaders.
 - xii. How to best assist an incapacitated CMW during self-escape considering available resources and circumstances.

Appendices

- [Appendix 1 Level 1 scenario CDCM 2022 surface assessors Guide](#)
- [Appendix 2 Level 1 scenario CDCM 2022 SE Mains assessors Guide](#)
- [Appendix 3 Level 1 scenario CDCM 2022 NWM assessors Guide](#)
- [Appendix 4 Debrief and manual information collection guide \(QMRS\)](#)
- [Appendix 5 Level 1 QMRS Team briefing CDCM 30102022](#)

References

- Queensland Government [Coal Mining Safety and Health Act 1999](#)
- Queensland Government [Coal Mining Safety and Health Regulation 2017](#)
- Queensland Government [Recognised Standard 08 Conduct of Mine Emergency Exercises Report on an Accident at Moura No. 2 Underground Mine on Sunday, 7 August 1994](#), Windridge, F. W., Parkin, R.J., Neilson, P.J., Roxborough, F.F. & Ellicott, C.W. 1996: Wardens Inquiry, Queensland Government