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**Front cover image:** Simulated vehicle fire in front of Newlands underground portals
Preface

This report has been compiled by the Level 1 Organising Committee from input provided by each of the assessors involved in the exercise.

Each assessor has written their own individual account of exercise observations for their area of responsibility. This results in the report containing a range of writing and grammatical styles.

The Organising Committee would like to thank Xstrata, Newlands Underground (NUG) mine management and mine workers for their assistance during the exercise, in particular Sam Cook who acted as the team’s ‘mole’ in preparation for the exercise.

The Organising Committee would also like to thank all assessors for their input and acknowledge the co-operation and assistance of all of those involved in the Level 1 Mine Emergency Exercise.

Lastly, the Organising Committee would like to extend their appreciation to the AUSDAC and Capcoal underground group for providing several new self rescuer units for use in the exercise.
Executive summary

Background

Following the coal mine explosion at the Moura No. 2 Underground Mine in Queensland on 7 August 1994, it was recommended by the subsequent Wardens Inquiry that “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).

This year’s annual Level 1 Mine Emergency Exercise was held at the Xstrata Newlands Underground Operation on Friday November 7, between 1620 hrs and 2015 hrs.

Xstrata’s Newlands Underground mine is an underground longwall coal mine located approximately 40 km east of the township of Glenden, and some 200 km south-west of Mackay, in Central Queensland.

Objectives

The main objectives of this and previous exercises were to…

- test the mine’s first response including self escape capability of mine workers using self contained self rescuer (SCSR) units and changeover to compressed air breathing apparatus (CABA) under simulated emergency conditions.
- test the efficiency of the Incident Management Team (IMT).
- test the ‘deployment’ of the Queensland Mines Rescue Service (QMRS).
- test ‘call out’ procedures for mine personnel living remote from the mine site.
- test mobilisation – monitoring of calls to remote resources

Scenario - Summary

In line with the objectives previously outlined the following scenario was chosen to test mine preparedness for a major mine emergency.

Normal access to the workings of the Newlands underground coal mine is achieved via ramp access into the previous opencut with the mine’s portals located at the base of the former opencut highwall, as shown in Photograph 1. It should be noted that these portals also act as the main ventilation intakes to the workings of the mine.

On the afternoon of the exercise two crews of miners were working in the mine, one crew of 7 were operating the longwall, located approx 2.7km inbye from the main portal, while another crew of 8 were working in the development heading approx 1.5 km inbye from the main entrance portal.
The emergency was caused by a contractor who, on a late Friday afternoon using his heavy rigid tanker truck delivered approximately 2,000l of fuel to a bulk fuel storage facility located in the opencut, within 100m of the main portal. While driving down the ramp, the truck’s brakes failed causing the truck to gain speed finally colliding with some infrastructure at the bottom of the ramp. Due to the severe impact, the truck rolled over, the tank ruptured and fuel was spilt. Shortly afterwards the fuel ignited and commenced to engulf the vehicle.

The truck driver was seriously injured in the collision and resulting fire, receiving serious injuries and burns but managed to crawl away from the truck. He collapsed out of sight behind some equipment near the incident location. There were no witnesses to the incident.

As more and more fuel spilt across the area in front of the portals the fire grew larger and also engulfed the belt coming from the adjacent portal. As the portals are main ventilation intakes, combustion products from the truck and belt fire were drawn into the workings where the crews were working.

Light winds and normal convection through the opencut carried smoke and combustion products towards the other portal openings and towards the second vehicle ramp at the end of the opencut.

It should be noted that this scenario is almost identical to recent incidents at mines in central Queensland where the failure of vehicle brakes caused an uncontrolled runaway of a vehicle resulting in an impact collision at the base of the mine ramp. In one incident the vehicle did catch fire, resulting in significant burns to the driver and triggering an evacuation from the underground workings as a consequence of smoke polluting the ventilation circuits.
Major conclusions

1. The use of CABA enabled the explosion risk zone (ERZ) controllers (deputies) to communicate and brief their crews as well as inform the CRO (Control Room officer) of their status and intended evacuation route.

2. All members of the evacuation crews took the exercise seriously and received valuable insight as a result of their involvement.

3. The “buddy” approach was evident all the way through the exercise and can be clearly seen in the video footage where personnel donning SCSR/CABA are being assisted by other members of the crew.

4. Care for the injured man/casualty management was very good.

5. Unexperienced workers at Newlands Northern underground wear a yellow reflective vest which made it easier for the ERZ controller to identify them in low visibility.

6. The ERZ Controller made a number of effective decisions and stuck to them providing good leadership to his crew.

7. The CRO maintained composure throughout the exercise, and sent messages via the personal emergency device communication system (PED) to update crew underground, and, importantly, to lift morale.

8. Identification that the tubes in the tube bundle system had burnt through and were all monitoring from the same location in the P3 portal occurred.

9. Newlands opencut fire team was deployed quickly and performed well.

10. Timely response time from local QMRS brigade members.

11. The E/IM IAP (Emergency/Incident Management Incident Action plan) had duplicate pages that allowed for each key function area to receive copies directly from the IMT (Incident Management Team) meeting.

12. The Logistic team worked well as a team and was very efficient in allocating and arranging resources.

13. NMA (Nominated Medical Advisor) attended and performed well.

14. Co-opted person in Control Room performed well.

Major industry recommendations

These recommendations apply to all underground coal mines and the industry in general.

1. Training in donning and use of self contained self rescuers needs to be addressed as indicated by previous level 1 mine emergency exercises, and as highlighted in recent forums in the United States of America. It is recommended to industry that a similar competency based training regime to that proposed by the United States
mining industry (at refresher intervals of 3 months) be implemented as well as ensuring that all mine workers have used a real self contained self rescuer or a training rescuer that has simulated heat and resistance capabilities.

2. Such training MUST reinforce that talking and not maintaining a tight seal around the mouthpiece whilst wearing SCSRs may be fatal in atmospheres containing noxious and toxic gases.

3. It is recommended that some of the mine workers who wore real SCSRs assist in the development of a presentation for all other mine workers on-site on the experience and effects of wearing a SCSR in limited vision. (Note: This same recommendation appeared in 2006 & 2007 Level 1 Exercise Reports).

4. Not only should training in the use of self contained self rescuers be reviewed, but also the option of installing “changeover” stations, or equivalent, where escaping mine workers can change over the self contained self rescuer in a less hazardous atmosphere, communicate with the surface and also have the option of remaining in the station for a period of time.

5. Industry needs to define the requirements for aided escape, i.e. how will injured/incapacitated personnel be dealt with. The continuation of ‘Fight or Flight’ group seminars is recommended.

6. All mines should modify their emergency response plans to contact the Queensland Mines Inspectorate via the emergency number enabling an immediate emergency response on behalf of the Department. (07 3237 1696)

7. Where CABA is used for first response, a system for re-hydration be investigated and implemented.

8. Consideration is to be given to review the minimum number of mines rescue trainees. With most people working 12-hour shifts this effectively reduces the number of trainees available to respond by half (due to fatigue related policies). Also as more and more people choose to live remote from mining areas overall availability of trainees will most likely be reduced while response times will be extended.

9. Protocols on how mines rescue trained personnel on-site are to be utilised should be developed. This can take into account the type of emergency, the number available and the specific duty card or other specialized needs.

10. Targeted research should be carried out to establish optimal spacing of CABA recharge station considering the higher air usage if injured workers are carried to safety. Also to be considered are the potential workload and condition of workers prior to the emergency. (In this instance the development crew were nearing the end of a twelve hour shift where they had undertaken a belt/section move and they were physically drained).

11. IMT is to ensure that the CRO is informed of intended actions so that he can confirm actions as required. This information transfer should be undertaken by a
single designated person. In this manner the CRO is receiving information from a single reliable source, all other information then becomes invalid.

12. Wherever possible mine workers should utilise underground transport for evacuation purposes.

The 2009 Queensland Level 1 Mine Emergency Exercise will be held at Cook Colliery.

Tilman Rasche - Senior Inspector
Chairman - 2008 Level 1 Mine Emergency Exercise Executive Management Committee
January 2009
Introduction

Background

Following the mine explosion at the Queensland Moura No. 2 underground coal mine in August 1994, it was recommended by the subsequent Wardens enquiry that

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

In December 1996 the “Recognised Standard 08 for the Conduct of Emergency Procedures Exercises” was first published and has subsequently been revised and published in 1999 as “Approved Standard for the Conduct of Emergency Procedures Exercises”. (Queensland Department of Mines and Energy Safety and Health Division 1999)

This document provided guidelines for conducting mine site emergency exercises as well as the requirement for a test of state-wide emergency response by holding a level 1 mine emergency exercise at one mine on an annual basis.

From 1998 to date, eleven level 1 mine emergency exercises have been held in Queensland, Australia.

Figure 1 – Location of Xstrata’s Bowen and Surat Basin coal mines, the Newlands UG operation is labelled ‘2’.

This report covers the 2008 Level 1 Mine Emergency Exercise held at Xstrata Newlands Northern underground operation on Friday November 7, between 1620 hrs and 2015 hrs.
Xstrata’s Newlands Northern underground mine is a longwall coal mine located approximately 40km east of the township of Glenden, some 200km south-west of Mackay, Central Queensland (see Figure 1).

**Scoping the exercise**

The 2008 Queensland Level 1 mine emergency exercise was held at the Xstrata Newlands Northern underground coal mine near Glenden, in Central Queensland.

The first scoping meeting for the exercise was held in April 2008 to determine a suitable mine for the exercise, reiterate the objectives for the exercise, propose a suitable team makeup and consider general logistics required for a successful exercise.

This first meeting also served to put forward names of four non Xstrata UG coal mine managers to participate in this year’s exercise as assessors. The particular benefit of including several mine managers is the ‘free lessons’ they would receive through their involvement in the exercise process.

Xstrata Newlands Northern underground mine management was formally advised of the exercise in May 2008.

An initial mine site visit was conducted in May 2008 by Greg Dalliston, Martin Watkinson and Tilman Rasche. The purpose of this visit was familiarisation with the surface and underground conditions and to formulate possible scenarios that would achieve the objectives of the exercise. Furthermore this meeting served to select a ‘mine mole’, i.e. an on-site person that could provide confidential support and information about the mine to the assessors’ team before and during the exercise.

A number of planning meetings that included the selected mine managers were held to ensure all information, mine and ventilation plans, procedures etc. from the mine were available to refine a single scenario and to ensure realism and applicability of the scenario for the mine and for the industry.

A full team briefing involving all 18 assessors was held on September 17 and on October 22 a further meeting was held covering the scenario, the teams conduct on the day and reporting requirements.

A risk assessment was also drafted and finalised over these team meetings ensuring any hazard associated with conducting this exercise had been captured and suitable and effective controls had been implemented.

A site visit by the team was held on October 23 for site inductions and general site familiarisation.

Effects of the scenario on the mine ventilation were considered including ventilation simulation and preparation of input data for the Simtars’ Safesim program, with
replication of the mine monitoring system completed and installed within an hour of exercise commencement.

A number of days prior to the emergency exercise all state emergency agencies, e.g. police, hospital and ambulance services etc. were notified that an emergency exercise was going to be conducted.

Final membership of the Exercise Management Committee was

- Tilman Rasche and Carissa Crozier - Department of Mines and Energy,
- David Cliff - Minerals Industry Safety and Health Centre (MISHC)
- Martin Watkinson - Vale Australia
- Marek Romanski - Cook Colliery
- Darren Brady and Larry Ryan - Simtars, Department of Mines and Energy,
- Jim Finch and Aubrey Bush - Vale Carborough Downs Coal
- Mark Freeman - Queensland Mines Rescue Service
- Chris Menzies - Solid Energy Spring Creek Mine, New Zealand
- Jacques le Roux - BMA Crinum Mine
- Greg Dalliston - CFMEU Mining & Energy Division Queensland
- Dr. Eric Bauer - NIOSH – Pittsburgh Research Laboratory, Pittsburgh, PA, USA
- Seamus Devlin - NSW Mines Rescue
- David Sykes - Moranbah North Anglo Coal
- Sam Cook - 'Mole' - Xstrata Newlands Underground.

The exercise was also attended by Gavin Taylor – Chief Inspector of Coal Mines, and Doug White – Deputy Chief Inspector of Coal Mines.

Objectives

The detailed objectives of this and previous exercises were to…

- test the mine’s first response
- test effectiveness of systems, not individuals
- test self escape capability of mine workers
- test competency in use of self rescuers
- test Control Room / Incident Room response
- test the incident management team (IMT), including rotation and changeover should the exercise continue past the end of the shift.
- test efficiency of tracking of personnel underground.
- test the ‘deployment’ of Queensland Mines Rescue
- test ‘call out’ procedures for mine personnel living remote to the nearest township.
- test mobilisation – monitoring of calls to remote resources such as Queensland Ambulance Services etc.
- test changeover of escape units i.e. self rescuer to CABA
- test the mine’s stress tolerance through contact by media
- test gas analysis capability
- test possible mobilisation and use of GAG, where considered applicable.
- Test the mine’s efforts in debriefing of mine personnel

Scenario

Normal access to the workings of the Newlands underground coal mine is achieved via ramp access into the previous opencut with the mine’s portals located at the base of the former opencut highwall, as shown in Photograph 1. It should be noted that these portals also act as the main ventilation intakes to the workings of the mine.

On the afternoon of the exercise two crews of miners were working in the mine, one crew were operating the longwall, located approx 2.7 km inbye from the main portal, while another crew of 8 were working in the development heading approx 1.5 km inbye from the main portal.

The scenario was triggered by a contractor who, using a heavy rigid tanker truck delivered approximately 2,000l of fuel to a fuel storage facility located in the opencut within 100m of the main portal and had an accident enroute - while driving down the ramp, the truck driver experienced a failure of the truck’s braking system which caused the truck to gain speed as it traveled down the ramp.

The truck driver was unable to slow the vehicle down, which collided with infrastructure at the bottom of the ramp and rolled over. Due to the severe impact, the tank ruptured and fuel was spilt. Shortly afterwards the fuel ignited and commenced to engulf the vehicle.

The truck driver was seriously injured but managed to crawl away from the truck. As a consequence of the intense fire he received substantial burns and collapsed out of sight behind some equipment near the incident location. There were no witnesses to the incident.

As more and more fuel spilt across the area in front of the portals the fire grew larger and also engulfed the belt at the adjacent portal, as shown in Photograph 2. As the portals are main ventilation intakes, combustion products from the truck and belt fire were drawn into the mine atmosphere and into the workings where the crews were located.
Light winds and normal convection through the opencut carried smoke and combustion products towards the other portal openings and towards the second vehicle ramp (Ramp 4) at the end of the opencut.

It should be noted that this scenario is almost identical to two previous mine accidents where the failure of vehicle brakes caused an uncontrolled runaway of the vehicles resulting in impact collision at the base of the mine ramps. The resulting impact caused serious injury to the drivers and in one case, where the truck burst in to flames, severe burns to the operator.

Ventilation modelling was undertaken to predict the anticipated spread of pollutants through the UG mine working. The mine’s Safegas (mine gas monitoring system) was replicated prior to the exercise and interfaced to the mine supervisory control and data acquisition system. This was done to enable the delivery of simulated mine condition information through systems familiar to the mine staff and which they would use in a real emergency situation.

Gas data is based on real information from the mine and uses Safesim – a Simtars software package which inputs predetermined gas concentrations into the mine gas monitoring system interface.
Assessor briefing

The briefing notes given to the assessor teams were as follows:

- Level 1 Mine Emergency Exercise to be held at Newlands Northern Mine at 16.20 hours, Friday, 7 November 2008.

- Scenario: A fuel truck lost its brakes while travelling down the main ramp to the mine portals and rolls, spilling its load of fuel and ignites, cutting off both portals, subsequently igniting the conveyor belt and polluting the intake airways of the mine.

- The truck driver, badly burnt but conscious, manages to escape and passes out behind near the incident location. There are no witnesses to the truck accident.

- The pollutants (smoke and carbon monoxide (CO)) spread into the development and longwall roadways.

- The development crew will not be able to evacuate through P3 entries due to the size and heat from fire.

- If the fire is not brought under control quickly it will spread into the portals igniting coal in the ribs.

- There will be no access past the fire and up the main ramp. Any personnel evacuating from the mine will need to travel up Ramp 4 at the far end of the pit to get to the surface facilities’ Muster area.

- At time of exercise, ensure that it is made clear to the CRO that no ‘000’ calls are to be made.

- The development crew will be affected by smoke entering the panel and visibility will be reduced. This will be simulated by using the darker tinted goggles.

- Longwall crew to be briefed that there is reduced visibility on the longwall face after a period of time (as per the pollutant spread sheets). This will be simulated by using lighter tinted goggles.

- Both crews will be provided with SCSRs for donning and use during the exercise.

- Driving a vehicle with goggles - if a vehicle was to be used to evacuate in poor (simulated) visibility conditions, requirement set by the exercise committee was that the observer/passenger would wear goggles and advise driver of route, speed etc. while wearing his goggles.
Information to be explained to crews prior to initiation of exercise was also given to the assessors, and is as follows:

- Exercise will start when notified of conditions by the mine, or you will be shown signs/pictures by the assessors in your panel.
- Take actions in the same manner as if a real emergency had eventuated except:
- DO NOT don your own belt worn SCSR – use the units provided to you by the assessors.
- DO NOT use the emergency phone (unless a real emergency occurs during the exercise)
- If you communicate with people outside your crew always ensure your communications commences with “This is a level 1 Exercise”
- You will only be given information if you take the correct action which would have lead to getting that information e.g. if you hold out a gas detector or look at the fixed gas sensors then you will be told or shown the exercise gas readings.
- On commencement of the exercise you can send someone to communicate if that would be your action to the information provided but ensure you “secure and make safe your place of work’ prior to commencing the exercise actions
- If you are asked to don a real SCSR for the exercise you may be asked to continue using that SCSR until depleted to allow you

Figure 2 & 3 – Pollutant spread through the development and longwall section
to get full experience of use rather than changing to another form of breathing device such as CABA.

- Information will be provided by the assessors as the scenario evolves.
- Clarify ‘parkup’ position of the shearer/ continuous miner in case of evacuation; this is to be discussed with the ERZ controller.

Furthermore, all assessors were given laminated coloured charts showing the layout of the underground operation and pollutant spread, as shown in Figure 2 and 3.
# The exercise

## Exercise timeline

### Table 1: Abbreviated summary of exercise timeline

<table>
<thead>
<tr>
<th>Location</th>
<th>Surface observation</th>
<th>Time</th>
<th>Underground Observation</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Room</td>
<td>CRO called Level 1</td>
<td>1628</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO had visual on fire</td>
<td>1635</td>
<td>Development crew don SCSRs</td>
<td>Development Panel</td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO called Level 3</td>
<td>1637</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Smoke at long wall, LW crew don oxygen.</td>
<td>1655</td>
<td></td>
<td>LW Crib Room</td>
</tr>
<tr>
<td>Control Room</td>
<td>SSE advises GM Xstrata and activated Xstrata crisis management.</td>
<td>1652</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>SSE contacts ISHR</td>
<td>1655</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>SSE attempted contact Mines Inspector</td>
<td>1657</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Surface mines rescue services arrive</td>
<td>1657</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO advises SSE that they do not have enough of their own rescue personnel on-site, suggesting to call up additional external resources.</td>
<td>1700</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firesite</td>
<td>Surface rescue truck arrives at firesite.</td>
<td>1703</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firesite</td>
<td>Opencut rescue team has set up breathing apparatus at bottom of ramp, western side.</td>
<td>1709</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firesite</td>
<td>LW crew leaves 21 CT using drift runner.</td>
<td>1713</td>
<td></td>
<td>21 CT</td>
</tr>
<tr>
<td>Control Room</td>
<td>District Inspector calls Deputy Chief Inspector</td>
<td>1716</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO advises that development had found patient and they were heading outbye.</td>
<td>1724</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMT</td>
<td>IMT meeting started.</td>
<td>1729</td>
<td></td>
<td>LW Portal</td>
</tr>
<tr>
<td>Control Room</td>
<td>Tube bundle system identified as inoperative.</td>
<td>1735</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMT</td>
<td>SSE requests doctor’s assistance from town, due to suspected CO poisoning.</td>
<td>1800</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMT</td>
<td>IMT meeting finished.</td>
<td>1821</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMT</td>
<td>First 2 Newlands QMRS personnel arrived in rescue room.</td>
<td>1807</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Surface observation</td>
<td>Time</td>
<td>Underground Observation</td>
<td>Location</td>
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<td>----------------</td>
<td>--------------------------------------------------------------------------------------</td>
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<tr>
<td>Control Room</td>
<td>CRO attempting to call open cut via radio, wrong channel and band.</td>
<td>1826</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operations</td>
<td>Ops group informs that fire out.</td>
<td>1828</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Oncoming CRO arrives.</td>
<td>1838</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>First time lamps taped off.</td>
<td>1845</td>
<td></td>
<td></td>
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<tr>
<td>Control Room</td>
<td>Nominated medical advisor arrives on-site with ambulance, reports to control.</td>
<td>1847</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>PED sent to development crew - change of exit route - exit via P4 takeoff chute, Dev crew failed to realise PED had been received.</td>
<td>1849</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fire officially extinguished.</td>
<td>1906</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMT</td>
<td>QMRS Duty Officer went to IMT</td>
<td>1910</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMT</td>
<td>IMT informs with CRO that fire is out.</td>
<td>1917</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Comms from CRO to dev crew - discussion on alternate evacuation route. Still no decision made.</td>
<td>1918</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO 1 stepped down and CRO 2 stepped up to Role of CRO</td>
<td>1931</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMT</td>
<td>ISHR requested from IMT gas readings at shaft, it was noted that only methane was recorded.</td>
<td>1940</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>NMA confirm that LW crew medically OK.</td>
<td>1950</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rescue Station</td>
<td>SSE requesting gas sampling of fans.</td>
<td>1952</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rescue Station</td>
<td>QMRS duty officer returns from IMT to brief rescue teams.</td>
<td>1955</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1957 Vehicle arrives to collect dev crew.</td>
<td></td>
<td></td>
<td>Development Panel</td>
</tr>
<tr>
<td>Surface</td>
<td>Development crew arrived at muster area.</td>
<td>2010</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Exercise officially concludes at 20:15
Underground section

Underground Evacuation from P4 Development

Assessors: Martin Watkinson, David Sykes, Sam Cook, Chris Menzies

The assessors arrived at the crib room just after 16:00 and made contact with the exercise controller to confirm their arrival at the designated location and confirm the start time for the exercise. 16:20 was decided to give time to adequately brief the development crew of the requirements for the exercise. The development crew as in the process of completing a conveyor belt move up and were located just inbye of 18 cut-through (CT) in the conveyor belt road.

The following briefing was given to the development crew:

- Make the place safe before the evacuation.
- Do not use their personal belt worn self contained self rescuer (SCSR).
- SCSR’s will be provided as required, 5 functional units and 3 training units were available.
- For the purpose of the exercise the crew members who wear the functional exercise units would be required to wear them for the full duration to get the maximum benefit and experience out of wearing a real SCSR. The normal procedure is for everyone to change to a CABA at the crib room.
- The ERZ controller was to be given a training unit so he would change to CABA and then be able to communicate with his crew and the Control Room as required.
- This would be a low light evacuation and each person on the crew would be provided with a pair of lightly spray-painted ‘jockey glasses’ to simulate likely restricted visibility under real emergency conditions.
- The assessors would provide information as it would have occurred as part of the exercise.
- Treat the exercise as a real event and do what you would do in a real event.

After the briefing the area was made safe and the crew re-hydrated by drinking water.

As the exercise unfolded and the CRO became aware of the surface fire he sent a PED to the ERZ controller “call control on 363”, this was received at 16:30 and the ERZ controller then went to the crib room to telephone control. When contact was made with the CRO it was 16:33 and during this discussion thick black smoke entered the panel at 16:35. The ERZ controller donned his SCSR and travelled inbye to find his crew who had donned theirs at the conveyor belt return roller.

One crew member quickly donned his SCSR and then went around checking his workmates. He identified that his mate did not have his nose clip fitted and assisted
him to fit his nose clip. Some of the crew had difficulty in donning their SCSR and there were issues with twisted hoses etc.

One SCSR had a missing nose clip/the nose clip was lost on opening the unit. This person was deemed to have collapsed and be unconscious. The exercise atmosphere in this location was set at 3800 ppm of carbon monoxide and 18.2% oxygen.

The development crew then evacuated back to the crib room to change from SCSR to their CABA units. The change over from SCSR to CABA was variable and during one of the changeovers the operator removed his mouth piece before purging the mask. The other two changeovers were done in a very effective way with the team following their training protocols.

The ERZ controller then contacted the CRO to confirm his location status and intended route out of the mine. There was some difficulty experienced by the control in hearing what was said and the CRO and ERZ controller reverted to non-verbal communication. There appeared to be confusion during this period as to the number of beeps that were transmitted/required.

At this point the assessors clarified the situation that one member of the crew was missing not “out of the exercise”

The ERZ controller then formed a team to search for his missing crew member, 4 of the crew were instructed to remain at the crib room and wait for his return.

The missing crew member was found collapsed in-bye in the belt road. Attempts were made to fit a buddy mask from one of the CABA units however difficulty was experienced with the purge system on the mask so the team fitted a SCSR with nose clips. The injured man recovered sufficiently to stagger, with help, back to the crib room.

At 17:23 the injured man had a CABA unit fitted and was still unsteady on his feet.

The ERZ controller verbally communicated with control and confirmed his status and intended evacuation route. He then briefed his crew on the intended plan of action and instructed two of the team to assist the injured man in the evacuation. It was decided not to take the vehicle because of the visibility and the fact it would not start with 18% oxygen. This decision was not challenged by any of the crew.

At 17:40 the four men wearing SCSRs were instructed to take them off by the assessors. These units had been worn for a total of 65 minutes and were still providing oxygen. At all time during the wearing the crew members remained calm and were breathing steadily even when walking out.

The ERZ controller made regular checks of the status of his crew and checked the condition of the injured man. The two crew members assisting the injured man consistently reassured him and asked him if he felt OK.

At 17:47 the crew reached the next CABA station at 11 CT. The ERZ controller contacted control and informed him of his team’s status and got an update on the fire situation. He also informed him that the injured man needed a rest.
At 18:00 the ERZ controller established that the injured man could not walk and he informed the CRO of the situation and his intention to travel back in-bye to the crib room at 18 CT to get the stretcher and Oxyviva.

The ERZ controller and one crew member walked in-bye to get the stretcher and other first aid equipment and returned to 11 CT at 18:25.

The remaining crew reassured the injured man and prepared a strategy on how they were going to carry the stretcher and how they would rotate.

The ERZ controller briefed the CRO on his situation and intended evacuation route and got an update on the situation with the fire.

The crew was then briefed on the surface situation and the plan to evacuate to the next CABA refill station at 4CT highwall dips. Discussion was held on how to manage the stretcher and it was decided that all six would carry it to share the load.

At 18:39 the team left 11CT carrying the stretcher with the ERZ controller guiding the way. At this point the assessors instructed crew to take their goggles off as they were carrying the injured man on the stretcher. Good progress was made to 10 CT where the crew rested and rotated their position on the stretcher.

Rests were then taken every couple of minutes and the crew reached 8 CT at 18:49. At this point the crew were exhausted and discussions were held on how much air remained in the CABA units and reality was recognised that they would not be able to make 4CT highwall dips.

The ERZ controller was adamant that they would not leave the injured man and a decision was made to travel back to 11 CT where the ERZ controller and the injured man would remain while the rest of the crew continued their evacuation.

At this point the injured man recovered sufficiently to walk assisted.

The ERZ controller then briefed all of the men on the plan for evacuating to 4CT highwall dips.

The evacuating crew arrived at the next CABA station (4CT highwall dips) at 19:08. At all times the crew kept a watch on their air pressure and knew the urgency of the situation.

The CABA suit air pressure readings on arrival were 110 psi, 75 psi, 100 psi and 170psi. The highest pressure was recorded on the injured man’s suit.

The ERZ controller contacted the CRO who was surprised that they were at 4 CT highwall dips despite this plan being communicated by the ERZ controller at 11 CT.

The CRO instructed the ERZ controller how the IMT wanted him to evacuate however the route meant walking back into the panel to travel through P4 take off road. This was challenged and the crew were instructed to wait for further instructions.

At 19:24 the crew were again instructed by the CRO to stay where they were as transport would be sent to pick them up.
At 19:35 the ERZ controller was informed by the CRO that there was a fall of ground in the P3/P4 entries, the fire was out and they were to evacuate across to 5 CT via the return and wait for the transport. This was questioned by the ERZ controller as there was no telephone there and it was a pump station.

Given that the fire was only just extinguished this would mean the return airways would still be full of pollutants. However the crew exited via the return and were given smoke goggles to wear to reflect the visibility conditions.

At 20:03 a transport vehicle picked up the crew and transported the crew to the surface. This crew were stopped and questioned on the way out of the pit by two different security marshals one asked if every one was present the second checked every individual against his list. This delayed the crew’s arrival at the surface muster area until 20:10.

**What worked well**

- CABA enabled the ERZ controller to communicate and brief his crew as well as inform the CRO of his status and intended evacuation route.
- All members of the evacuation crew took the exercise seriously and received valuable insight as a result of their involvement.
- The “buddy” approach was evident all the way through the exercise and can be clearly seen in the video footage where personnel donning SCSR/CABA are being assisted by other members of the crew.
- Clear communication was made inter-team (Intra-team?) and to surface with evacuation milestones being set.
- The ERZ controller communicated a simple staged evacuation plan.
- Blind men sticks were used to keep the crew together during the evacuation
- Care for the injured man/casualty management was very good.
- Inexperienced workers at Newlands Northern underground wear a yellow reflective vest which made it easy for the ERZ controller to identify them in low visibility. (There was minor confusion here because the exercise assessors also wear yellow reflective vests.)

**Points for Consideration**

- Training and refresher training is required in the donning of SCSR at regular intervals as it took up to 3 minutes to don the SCSR’s.
- Vehicles should be used for evacuation whenever possible. Attempt to start the vehicle and if it starts, drive out.
- A wheel/wheels on the stretcher would have improved the ability of the evacuating crew to transport an injured worker with less effort.
• When crews are evacuating from underground part of the IMT process should be to communicate evacuation options to them. Whilst this was done at IMT it was not communicated until the team had evacuated past the planned route.

• Communication to the crews from the surface needs to be improved, when a direction is given there needs to be an associated explanation as to why and what information/assumptions have been used.

**Recommendations**

**Mine**

• P4 development crew should brief the remainder of the mine including the management on their experiences during the evacuation including:
  - Wearing of SCSR
  - Low light evacuation
  - Communication process (instructions re evacuation routes including being sent to wait at a location where there was no telephone)
  - Non-use of the vehicle

• The mine should review its policy regarding communication of an incident to underground personnel - standard messages such as “Call Control on 363”: should not be used in an emergency, instead it is suggested to use “Emergency Call Control”.

**Industry**

• Training in the donning and use of SCSR in low visibility conditions should be conducted as recommended in previous exercise reports and highlighted in recent forums in the United States of America with 3-monthly training intervals being suggested. This training should also cover what actions to take should the nose clips be lost during donning of the SCSR.

• It is recommended to industry that a similar competency based training regime to that proposed by the United States mining industry (at refresher intervals of 3 months) is implemented as well as ensuring that all mine workers have used a real self contained self rescuer or a training rescuer that has simulated heat and resistance capabilities. *(Note - This is the same recommendation as appeared in 2006 & 2007 level 1 exercise reports)*.

• Not only should training in the use of self contained self rescuers be reviewed, but also the option of installing “changeover” stations, or equivalent, where escaping mine workers can changeover the self contained self rescuer in a less hazardous atmosphere, communicate with surface and also have the option of remaining in the station for a period of time.
Industry needs to define the requirements for aided escape, i.e. how will injured/incapacitated personnel be dealt with. Completion of Fight or Flight group seminars.

Evaluation of the options for fitting wheels to stretchers/stokes litter

Exercise team

The assessors should carry sufficient water and have strategic stocks to provide the evacuating miners who are wearing SCSR/CABA.

The evacuating teams need information to be sent to them regarding the status of the incident ie is the fire being tackled, is the fire out? This enables the accurate play-out of the scenario for the underground personnel.

Longwall Evacuation

Assessors: Jacques le Roux, Aubrey Bush

At 16:20 the longwall personnel were in two separate groups. Three operators and the ERZ controller were on the face producing with the remainder of the crew having crib at the crib room. The face position was approximately 50m in-bye of 30c/t with the crib room and deputy station between 29 and 30c/t.

At 16:40 the main gate operator received a phone call from control requesting that the ERZ controller contact control immediately. At 16:42 the ERZ controller spoke to control. After the call he and the crew closed down the face and then proceeded to the crib room. Just before arriving at the crib room at 16:46 a general PED message was received to evacuate the mine. At 16:51 all 8 longwall personnel were gathered at the LW crib room at the instruction of the deputy. The ERZ controller then notified the crew of the plan to evacuate to P2 using a vehicle and instructed three operators to proceed out-bye to 29c/t and prepare 8 CABAs for the evacuation of the mine.

Three operators proceeded to 29 c/t to prepare the CABAs and blind man sticks. The ERZ controller called control at 16:54 indicating his intentions and that all longwall personnel are accounted for. After the call the remainder of the crew got into a second vehicle and proceeded to 29 c/t FREEK station. At 16:55 the crew now all at FREEK station were shown a card showing they could smell faint smoke and they were handed smoke goggles to don. The deputy immediately instructed to the crew to don their CABA.

At this stage they were asked by the assessors to first don SCSRs and then switch over to CABA to give the crew some exposure and assess the effectiveness of the changeover.

Fitting of the SCSRs was completed with varying degrees of effectiveness, there were some twisted hoses, however overall all the men were able to successfully don and use the SCSRs. Five training units and 3 real units were used to conduct this
exercise. The 3 men with the real SCSRs were asked to remain using them, but to take CABA units with them.

The rest of the crew including the deputy then changed over to CABA. This was again conducted with varying degrees of effectiveness, but they were all able to successfully don and use the CABAs. (the main area of difficulty was pulling the straps of the CABA suits).

At 17:10 the ERZ controller contacted control who had some difficulty understanding him and he proceeded to use non-verbal communication. The ERZ controller made the decision to use a single vehicle. He took a gas reading which indicated 13 ppm CO, 20.7% O2, 0.1% CH4 and 1 ppm H2S.

The crew effectively fitted their CABA suits however improvement can be made by reinforcing the process of getting men to assist each other and check each other’s suits when fitted. The discipline of regular pressure checks of CABA suits also needs reinforcement for crews when wearing CABA.

At 17:13 the vehicle with all longwall personnel proceeded out-bye in the travel road. The blind man sticks were left behind as they were loaded on the other vehicle. The driver was asked to remove his smoke goggles, but was asked to drive on the instructions of the front seat passenger who was wearing goggles. On reaching 26c/t he attempted to turn right into MG03 face road, but was corrected immediately by the ERZ controller to proceed outbye.

They stopped at 21/ct FREEK station at 17:18 and the ERZ controller updated control on their status and were given more information about the incident. He again took a gas reading which now indicated: 31ppm CO, he indicated this to control. The crew then left at 17:19 to continue evacuating the mine.

The longwall crew continued to evacuate and reached the portal at 17:29. The ERZ controller instructed the driver to turn left away from the incident site. They stopped and he made a phone call to control from the P2 surface sub station. He indicated that they were wearing CABA suits and asked if assistance was required at the fire site. Control indicated that their assistance was not required at this time – and that the wind direction would blow the fire towards the men and the ERZ controller and crew proceeded towards ramp 4 where they met with a sentry at 17:35. At this stage fresh air was indicated and they removed their CABA units. The three operators wearing the SCSRs were asked not to remove the units to give continued experience.

The sentry attempted to contact control, but there were no reception on his hand held two way radio. He asked the deputy to act as sentry and at 17:43 proceeded to transport the three operators and an assessor to the main office area. He had some difficulty finding the way at one stage and one of the operators directed him towards the correct road. He made no communication with anyone during the trip. He passed the sentry at Ramp 5, but again no communication was made. The vehicle reached the go line area at 17:51.
The crew went to the surface rescue room; the SCSRs were removed at 17:55 with none of the operators experiencing any difficulty breathing. The three operators reported to control where their tags were moved and they were instructed to proceed to the debriefing room at 17:57.

The longwall crew were evacuated from Ramp 4 in three groups – the last three members reaching the Muster Area at 18.15. The longwall crew were debriefed individually by the Weekend Supervisor.

What worked well

- Donning of the SCSRs was achieved successfully
- The duration of the three non-training SCSR’s was good, they comfortably lasted 60 minutes.
- Non-verbal communication awareness was good.
- Evacuation completed with the assistance of vehicles made the evacuation more effective and less stressful on the crew.
- The ERZ Controller made a number of effective decisions and stuck to them providing good leadership to his crew.
- Consistent updates with control kept the surface updated on the crew’s movements underground.

Areas for improvement

- Operators attempted to communicate with SCSR’s donned.
- Two of the crew had difficulty changing over from SCSR to CABA – at that time the crew were only in 13ppm CO (Exercise data). It appears again that changeover needs to be regularly practised.
- The process where miners assist each other in fitting and checking each others CABA suits when donned needs to be reinforced.

Recommendations

Mine

- A more structured and better resourced people control mechanism needs to be in place for the crews when they exit the mine.
- Train people to take emergency equipment (i.e. blind man sticks and first aid kit) with them during escape.
- Ensure radio coverage in all areas of surface operation.
• Improvement is needed for sign posting from Ramp 4 to Muster Area.

• Encouraging mineworkers to assist each other in the fitting of CABA suits needs reinforcing.

• Two operators had problems with CABA straps when fitting the suit – the mine should check their suits.

Industry

• Training in donning and use of self contained self rescuers needs to be addressed as indicated by previous level 1 mine emergency exercises, and highlighted in recent forums in the United States of America. It is recommended to industry that a similar competency based training regime to that proposed by the United States mining industry (at refresher intervals of 3 months) is implemented as well as ensuring that all mine workers have used a real self contained self rescuer or a training rescuer that has simulated heat and resistance capabilities. (Note: This is the same recommendation as appeared in 2006 & 2007 level 1 exercise reports).

   Not only should training in the use of self contained self rescuers be reviewed, but also the option of installing “changeover” stations, or equivalent, where escaping mine workers can changeover the self contained self rescuer in a less hazardous atmosphere, communicate with surface and also have the option of remaining in the station for a period of time.

• It is recommended that a forum of stakeholders be urgently established to develop and implement a set of protocols covering the interactions between mine site first response teams and external aided-rescue organizations. Each of these practices provides specialist, but separate, skills and resources and it is vital that the issues involved in their interactions be identified and coordinated. There is little doubt that CABA teams will increasingly form part of emergency response capabilities in our industry and we must be prepared.

• The protocol by which mineworkers using SCSR’s for self escape, having reached a place of safety can then offer first response duties – needs industry discussion and development. Completion of Fight or Flight group seminars.

Exercise Team

• The base briefing for all the underground crews by the assessors around communications protocols (Starting communications with “This is an exercise”) and safety protocols (ensure you do nothing that is unsafe) etc. worked very well and should continue to be done in future exercises.
Surface section

Newlands Control Room

Assessors: Larry Ryan, Darren Brady and Eric Bauer

As expected at the onset of the incident the volume of work for the CRO was extremely high. Multiple gas alarms were acknowledged and communication in and out of the control increased.

After the incident was “initiated” the first indication of a problem to the CRO was gas alarms indicating 50ppm carbon monoxide (CO) at real time monitoring point 3, P3 2c/t A-B (Jiffy) and real time monitoring point 11, P3 Belt Road 2-3c/t.

The CRO telephoned the development panel to get confirmation of gas concentrations by the deputy, and when he received no answer sent a PED for them to contact him. Subsequent feedback from the development panel was that they might not have responded immediately to the PED had they not known the exercise was on.

The CRO referred to the Gas and Atmosphere Management TARP 04 and used 50ppm to determine that it was a level 1 situation. At this stage there was no indication that it was recognised that 50ppm was the maximum measurement possible and that the CO concentration could in fact be much higher.

The CRO contacted the senior mining official on-site (Longwall Superintendent) and advised on the situation.

The CRO was informed of the truck fire at the P3 Portal and got a visual of the fire via the camera (see Photograph 3) and called a "level 3 code red". The CRO continued to monitor the situation, alerted the longwall and development crews to evacuate, communicated decisions to the appropriate receivers, and monitored the progress of the escaping workers.

The decision was made by the senior mining official on-site not to release the stench gas (this may have been based on the fact that it was just an exercise).

The Duty Cards were initially issued from the Control Room.

As per 'Duty Card 1' – Surface Control, a Backup Controller was appointed and continued in this role till the end of the exercise.

With the volume of communications and information coming into and leaving the Control it was impossible for the CRO even with the assistance of the Backup Controller to log all of this information.

The CRO used non-verbal communications with underground crews on several occasions generally with success. There were issues with gaining information on the number of persons underground using this technique.

It was identified quickly that the off-scale readings on all tubes was due to the tubes burning through at where they exit the P3 portal.
The incoming CRO arrived at 18:39 and was briefed by the Backup Controller.

Samples were collected from P1 and P2 portals and delivered to the Control Room for GC analysis. These samples were analysed promptly.

No samples were collected via the tube bundle system prior to or post tube burn through for analysis by gas chromatograph (GC). Such analysis would enable the determination of the off-scale carbon monoxide readings and enable an accurate assessment of explosibility that would include carbon monoxide and hydrogen. This information would also allow determination of ratios such as Graham’s and Trickett’s to assess intensity and possibly determine what the fuel source was.

In general, the Control Room was chaotic, yet functioned well considering all that was happening. A multitude of functions and distractions were occurring, usually simultaneously. The primary distractions included the constant flow of personnel in and out of the Control Room, requests from the window, and outside phone calls. The CRO performed admirably, seemed not to get rattled, maintained his professionalism, and handled all duties, functions, and requests.
Doug White – Observer/Assessor

We arrived at the Control Room approximately 15:00 and started to set up. The CRO was informed of the reason for us being there (although he already knew) and briefed on what our expectations of him were. The exercise was triggered at 16:20 and I was present in the Control Room until 16:39

What worked well

- The CRO started all communications where appropriate with “this is an exercise only”.
- The CRO maintained composure throughout the exercise.
- The CRO sent PED messages to update crew underground and to lift morale.
- The proximity of worker tags and tag board to the Control Room allowed for quick and accurate accounting of worker locations, at least from within the Control Room.
- The on-site gas chromatograph had already had a calibration check run that day and as such was ready for use.
- There was minimal unnecessary communications out of the Control Room.
- Non-verbal communications between the CRO and underground personnel were effective although there were some problems with communicating the number of personnel.
- Identification that the tubes had burnt through and were all monitoring from the same location in the P3 portal.
- Control Room was well organised
- Control Room operator was well organised.

Areas for improvement

- The off-scale value of 50ppm for CO was initially used to determine that a “Level 1” TARP was activated. This assessment was made without consideration that CO may in fact be higher. CO make was not considered with respect to TARPs.
- Indication of urgency in PED messages sent should be included when advising personnel to contact control during an incident.
- Although the person appointed as Backup Controller as per Duty Card 1 – Surface Control did a good job, having a trained/experienced Control Room operator as an assistant to the Control Room operator would be advantageous. This would allow the assistant to offer a greater level of assistance as they would be familiar with the
communication channels used, gas monitoring systems and requirements for logging actions taken in the Control Room, all duties under Duty Card 1.

- Due to the volume of information coming into and going out of the Control Room in the first couple of hours it was difficult for the CRO to log everything. This can make the briefing of the oncoming CRO difficult.

- To ensure contact with the Mines Inspectorate during an incident the emergency contact number 07 32371696 should be used.

- There were issues with the issuing of Duty Cards from different locations.

- Problems were noted with contact numbers the Backup Controller was using to contact personnel to inform them of what was happening.

- Incoming external calls during any incident should be filtered from the Control Room.

- There were significant issues with radio communications in Control Room.

- Notification of external agencies and offsite Newlands Northern personnel could be improved.

- Tracking of underground workers’ location could be enhanced if the tracking function of the PEDs was operable.

- All instructions to the Control Room were verbal, with no written instructions received. As the CRO was often required to convey these instructions and because of the volume of communications handled by the Control Room written instructions would be preferable.

- Verification of decisions, who made them, where they came from, and who should receive them may be improved.

- Consideration as to which tube bundle points were affected by the incident and subsequent “holding” of these points to limit system to the points of interest would give more regular information on the event.

- Being able to divert bag out from the tube bundle directly to the gas chromatograph would make the running of samples from the tube bundle sample points through the GC efficient and easy.

- Determination of magnitude of off-scale gas concentrations on automated monitoring systems should be made using on-site gas chromatograph.

- Although identified that tubes were burnt through at the fire site no samples were collected from the tube bundle for GC analysis.

- Checking of tubes bundle monitoring system for vacuum pressures of tubes would have confirmed that tubes had been compromised.

- No assessment of explosibility for off-scale tube bundle monitoring points was made using gas chromatograph results. GC analysis incorporates high carbon
monoxide and hydrogen concentrations that contribute to explosibility and not accounted for by automated monitoring.

- Identification of the injured truck driver, the company he worked for, the truck’s cargo and the tracking of where he went could have been dealt with better including updating the CRO on this information.

- The briefing process for the oncoming CRO could be improved.

- In this instance bag samples were only presented to the CRO once the oncoming CRO had arrived. This allowed a dedicated gas chromatograph operator to run samples on the gas chromatograph while still having an experienced CRO in the Control Room. In other circumstances the need to run bag samples may have left the Control Room without an experienced CRO.

**Recommendations**

**Mine**

- Suitably trained/experienced personnel to be available as Backup Controller.

- Improved briefing of oncoming CRO.

- Screen external calls coming into Control Room during an incident.

- Review radio communications in Control Room. Radio communication channels/bands listing for site-wide communication.

- The mine should review its policy regarding communication of an incident to underground personnel - Standard messages such as “call control on 363”: should not be used in an emergency. Suggest use “Emergency Call Control”.

**Industry**

- All mines should modify their emergency response plans to contact the Queensland Mines Inspectorate via the emergency number 07 3237 1696. This means that the Queensland Mines Inspectorate emergency response can start immediately.

- Off-scale readings on the tube bundle should trigger immediate bag sample collection. There is slow response in obtaining and analysing bag samples.

- Look at “text messaging” possibilities for underground phones.

- Awareness of maximum concentrations that can be measured on mine monitoring systems.

- Have an experienced CRO(s) that can assist the CRO(s) throughout any incident.

- Implement monthly leak checks (as per Australian Standard AS2290.3, Standards Australia 1990) and determination of draw times for each tube for tube bundle system.
• Monitoring and logging of vacuum pressures for each sample tube to identify any compromised tubes.

• Screen external calls coming into Control Room during an incident.

• Look at improved ways of logging incoming and outgoing communications during an incident in Control Room.

• Review radio communication channels/bands listing for site-wide communication. Review radio communications in Control Room to ensure adequate coverage of all channels operating across site.

Exercise team

• Printing equipment needs to be available or included with monitoring equipment used during exercise.

• Improved communications from fire sites back to assessors generating gas results and any visual indications of fire status.

• Confusion over the identity of the driver of the truck was created by utilising a Newlands Northern employee to play the role. Future casualties in exercises should not be known to host mine site

• Minimise the number of assessors in the Control Room during the incident and assign assessors to particular tasks and observations within the Control Room.

• Simulate men down so that mine rescue team must enter the mine to perform a rescue.

• Audio recording of Control Room, IMT etc. and putting a timeline into the recording.

• Video of the Control Room so people entering and at window are captured with timeline included i.e. Clock in the frame.

• Ensure we have knowledge of all stations, and manning to cover all stations of interest during the exercise.

Mines Rescue and Emergency Response

Assessor: Greg Dalliston

The incident occurred at 16.20 and fire was identified and confirmed by outbye deputies at 16.33. The surface rescue team was activated at 16.40

The outbye deputy was charged with the responsibility of getting fire fighting equipment and available persons from the surface to the fire site and to run out hoses

He made a decision to keep a fitter on the surface to be able to surface (is this the correct word?) or repair any equipment required for incident response.
The Newlands Opencut Rescue Team was called out by the CRO at 16.46 and arrived at control at 16.57 (4 members and the surface rescue and fire truck) and shortly after were escorted to fire site at the ramp arriving at 17.03. About the same time 3 further surface rescue members arrived by minibus. The time taken for the teams to arrive at the underground mine was assisted by the Opencut Rescue teams currently undergoing a remanning program and they were conducting block training at the time of level 1 exercise.

An estimated normal call out time of 45 minutes was given by the team members, if they were at their normal work places.

At 17.00 the Control Room operator identified that they did not have enough QMRS brigadesman on-site and those employed by the mine were called out.

QMRS were called out at 17.22.

A watercart was requested from the opencut and arrived at 17.25.

Opencut resources were promptly provided when requested and operated efficiently. For example Opencut examiners were called to transport and escort underground coal mine workers who had escaped from the mine around the opencut road as the underground access ramp was closed due the fire.

A number of underground personnel including contractors were utilised for operations around the surface and later sent underground with CABA suits. Until coordinated by the Rescue Station Coordinator these people took CABA from the rescue room with no logging of suits or utilisation of gas detectors for persons who were entering contaminated air.

At 18.07 three Newlands QMRS brigadesmen arrived at the Rescue Station and two others were being utilised by IMT to perform other functions. These highly trained members and the Rescue Station Coordinator did not receive any official briefing by anyone from the IMT or its functional areas (Planning, Operations, Logistics).

Technical services mineworker was given a task by IMT to get a first hand view of the fire site and take a bag sample of the atmosphere as close to the portals as possible. To do this he needed to access the portal area via Ramp 4 and hence needed to have a vehicle flag, gas detector and gas bag and pump. This task from time of allocation to time sample arrived to be analysed was approximately 1 hour 45 minutes.

A PJB arrived at the surface muster area with the injured truck driver on a stretcher and the brigadesmen assisted with moving him to the first aid room to await the ambulance. This was done very efficiently and with due care for the patient.

The QMRS Duty Officer arrived at 19.07 and went straight to the Rescue Station where he notified the Rescue Station Coordinator of the expected arrival time and numbers of mutual response persons. Two additional QMRS officers were on their way with additional rescue gear, and 7 brigadesmen from Moranbah North and 5 from North Goonyella were in transit from their respective mines.
Three Titan contractors were sent to the Rescue Station to get CABA suits to go to the fire sites to conduct a fire watch.

At 19.55 the QMRS Duty Officer returned from the IMT and conducted a verbal briefing for Rescue Coordinator outside the Rescue Station with no mine plan and written information used.

Two mineworkers with CABA s sent to take PJB down to P2 portals and across to P3 then to 5ct P3 to pick up the development crew. They were instructed to go this route because the roof may have been damaged by fire just inbye of portals.

The QMRS Duty Officer and the Rescue Coordinator went inside the Rescue Station where the other brigadesmen provided a mine plan and the Duty officer briefed them. The information provided by this time had been superseded by other actions and the brigadesmen updated the Duty Officer on events to date from their observations.

Shortly after the development crew and the Opencut Rescue teams arrived back at the Muster area and the exercise was terminated.

The Moranbah North Team members arrived just as the exercise was concluded with a response time of approximately 2 hours 45 minutes.

**What worked well**

- Outby deputy performed really well in early stages in organising fire fighting equipment on surface
- Surface fire team deployed quickly and performed well
- Good control of Rescue Station by duty card holder
- Timely response time from local QMRS brigade members
- The response by mutual assistance (QMRS) was good considering the time of day and distance to travel.

**Points for consideration**

- The mine should ensure that after any incident or exercise the mineworkers who participate in such activity are debriefed to ensure that the SHMS (write out - not in glossary) is effectively reviewed
- No use of QMRS trained persons who could have responded using CABA
- Radio dead spots in surface areas need to be identified and corrective actions implemented
- A continuing concern relative to mobilisation times of mutual assistance
• Transfer of information from IMT to rescue teams lacked detail and was less than current

• There was no underground person appointed as incident site controller to assist or give directions to Opencut rescue team if they needed to take actions that may have affected the underground mine or mineworkers still attempting to escape from the mine

• Persons deployed to areas potentially affected by the fire or products of combustion whilst taking CABA did not take gas detection detectors

• Actions requested by IMT should be conducted in a timely manner and the SHMS should have an action by which these are followed up to ensure they have been undertaken and results recorded

• QMRS representatives should ensure that they receive sufficient resources and timely information to give briefings to brigadesmen

**Recommendations**

**Mine**

• Mines that are relatively isolated from their mutual response mines should have sufficient QMRS brigadesmen trained to enable deployment of teams in a timely manner OR first response systems need to integrate use of site rescue personnel to ensure highly trained rescue persons are not a wasted resource.

• Regular and timely updates of current status of incident should be given by IMT to key areas and personnel including Rescue Station / teams and CRO

• Debriefs are critical after the exercise. The mine should review SHMS. This review should be conducted by the mine as soon as practicable and should include the opencut and underground mineworkers and both mines’ systems should be reviewed.

• Where underground mines utilise surface rescue teams for response these teams should be familiarised with areas, equipment and systems. These teams should be allocated by the controller who has knowledge of the relative hazards and area of the underground mine relative to the incident.

• Actions and decisions made outside the IMT must be recorded and relayed to the IMT.

• Availability of escaping crews to talk directly to IMT representative for two-way communication on appropriate escape routes

• Where surface rescue teams are using turn-out gear to fight fires for extended periods sufficient persons should be available to enable changeover due to fatigue and exhaustion.

• Timely action and tracking of IMT action requests
• Easy identification of clean skins should be considered as a way for persons leading an evacuation to allow them to assist or check these mineworkers. (this is unclear as to what is meant!)

• Need to establish communications at incident site to enable contact with operations or logistics etc

**Industry**

• Where CABA is used for first response, a system for re-hydration be investigated and implemented

• It is important that there is provision for communications out of the Control Room as all stakeholders must be kept regularly briefed on currency and status of events.

• It is recommended that IMT should directly brief anybody being dispatched from the surface (mines rescue fresh air base personnel, transport drivers, mines rescue teams, etc) or at least be present during the briefing.

• It is recommended that a person be allocated as Surface Coordinator to oversee all of the surface tasks, movement of personnel in and out of the mine and liaison with IMT. The control, allocation and updating of the deployment and availability of resources is a vital function of a coordinated emergency response and cannot be overlooked.

• It is recommended that a forum of stakeholders be urgently established to develop and implement a set of protocols covering the interactions between mine site first response teams and external aided-rescue organizations. Each of these groups provides specialist, but separate, skills and resources and it is vital that the issues involved in their interaction be identified and coordinated. There is little doubt that CABA teams will increasingly form part of emergency response capabilities in our industry and we must be prepared.

• There needs to be a review of the number of brigadesmen that the mine can supply at any time of the day or work roster. This could also be expanded to other mines in the mutual assistance group.

• Consideration should be given to a review the minimum number of mines rescue trainees – with most people working 12-hour shifts this effectively reduces the number of trainees available to respond by half (fatigue related policies), also with people choosing to live remote from mining areas response times/availability of trainees is extended.

• Protocols on how mines rescue trained personnel on-site are to be utilised should be developed. This can take into account the type of emergency, number available and specific duty card or other specialized needs.

• Process management (decision-making process, time wasting, verification of data, information flow in and out of the incident management room, briefings done on time, checking milestone events, interaction of members) remains a vital part of
incident management and must always be at the forefront of the operations within the IMT.

**Incident Initiation, Planning Function, Information Collection and Dissemination Process**

**Assessor:** David Cliff

**Incident Initiation**

When the first gas alarm was triggered, the CRO had difficulty identifying a suitable TARP to refer to for the alarms coming from the CO sensors. Initially he referred to a general mine atmosphere TARP which is designed for chronic exposure to CO rather than fire. This defined the situation as a level 1 TARP. There is no level 3 TARP for this TARP. Once smoke was identified then the mine fire TARP defined the situation as a level 3 TARP. The mine needs to ensure that the TARPS are set appropriately and that site personnel know which one to refer to. There is no reason why the gas TARPS are not listed within SAFEGAS.

When the exercise was initiated the CRO called the development panel and was unable to reach anyone at crib room. They called back.

The CRO did not recognise that 50 ppm was full scale on real time gas sensors. Perhaps the SAFEGAS system should display full scale reading differently to allow easy recognition of this. It was not till 16:36 that level 3 TARP was flagged and evacuation initiated.

Callout of key personnel was initiated by Longwall Superintendent who was still on-site when incident initiated. SSE was called and arrived on-site within 10 minutes of call.

Some duty cards were issued from Control Room at 16:50. Note that most duty cards were issued from IMT room by Underground Mine Manager who assumed Planning Controller role.

At 16:55 Operations Controller (pre IMT) listed all persons who had been called and what their estimated time of arrival was.

The various office areas had prepared labels on the reverse of the normal signs that allowed quick identification of key groups.

**Incident Management**

It is difficult to accurately assess the effectiveness operation of the IMT and the emergency response system. The key elements required for controlling the situation were initiated prior to convening the incident management process. The ability of the surface fire crew to rapidly respond meant that the fire could be quickly brought under control without requiring the IMT to be involved. Thus the IMT did not play a major role in the control of the incident. The simplicity of the incident did not require complex
management processes to be applied. The IMT only operated for two hours and thus were not exposed to the pressures or complexities common in past exercises. The informality of decision making and information collection and recording was adequate under these conditions.

The Incident Controller or as the duty card calls him the Emergency/Incident Manager (E/IM) partially used the incident action plan (IAP) (not in glossary) books provided as prompts for the IMT meetings. Three meetings were documented but only one IAP contained any description of the current situation.

There was no formal record of the current or predicted situation. The scribe in the IMT maintained a log of actions but there was no record of decisions. For example: it was identified at 6:20 pm that the IMT needed to know more about the fire but there is no record of any decision about how to do this.

The log in Operations contained a lot of information that did not appear at the IMT meetings and thus was not transmitted to other groups. This log also documented operations personnel carrying out what would normally be classified as logistics functions such as summoning fire brigade, ambulance and pizzas. From the concentration of functions in Operations it would appear that in many ways they were a de facto IMT.

The main Duty Card Register was not filled out, nor were the IMT Appointment Form or the Duty Card Log. These details were noted on the IAP, so it must be questioned whether or not these documents are necessary. There are a number of documents and forms attached within the E/IM Duty Card Folder that duplicate functions in operations and other areas. For example it is not clear why there are debrief forms in the E/IM folder when these are the responsibility of Operations and Logistics. The focus of the E/IM should be strategic overview and decision-making – these documents could be removed from this duty card and allocated to the appropriate area.

Duty cards were being issued from the Control Room and from the IMT area. Not all persons in key roles accessed their duty card folders or wore their identifying tabards. There was no evidence that key officials accessed their duty cards to check that they were carrying out all their functions. All officials appeared familiar with their roles.

A key function defined in the E/IM Duty Card is the issuing of timely decisions and providing clear instructions in writing to personnel appointed under the emergency management structure. No written instructions were issued during the exercise.

There was no evidence that the debriefing information obtained from underground personnel was distributed beyond the Operations area.

The E/IM did set the objectives early in the IMT process and restated them at each meeting. He provided clear directions – though not documented and made key decisions e.g. not to shut the intake doors remotely.

At three of the IMT meetings the E/IM did distribute duplicate copies of the IAP that he partially filled out – to ensure commonality of tasks.
Planning Function

The incident management system employed at Newlands Northern Underground (NUG) is derived from the MEMS system developed by the QMRS. This, in turn, is derived from the ICS system as used by emergency services throughout Australia. However, there are significant differences between the standard MEMS and that employed at NUG. In particular the planning function is usually defined as:

The collection and analysis of incident information and the planning of response activities. When appointed, the Planning Coordinator shall:

- obtain a briefing from the Incident Controller
- process information relating to the current and predicted incident situation
- maintain records about the location and deployment of resources
- maintain an information service
- liaise with technical specialists
- chair planning meetings with other members of the Incident Management Team
- develop alternative control objectives and strategies
- coordinate the development and dissemination of the Incident Action Plan
- organise incident demobilization

Consulting the NUG Duty Card 4 – Technical and Planning Control (T&PC) dot points 3, 4 were not included. These functions do not appear to have been transferred to any other duty card. The absence of current information on the status of the fire and those underground hampered the efficient discharge of the planning function. The duty card does require the T&PC to ensure that the data provided to all control groups is accurate and is the last validated revision of that information, but does not require him to collect or analyse it. Judging by the other dot points in the duty card this may only refer to maps and gas analysis. During an incident there is a plethora of other information that needs to be collected. For example; the status of the fire fighting was not recorded. The check points referring to identifying any equipment required for emergency rescue and recovery operations and related resources were actually carried out by Operations and Logistics. The T&PC did not maintain a log of actions, appointments made, instructions given or communications made, consequently he did provide original copy to the emergency incident manager. NUG should review the need for these documents in view of this.

The T&PC area was managed by the Underground Mine Manager. Normally he would be the relief E/IM and thus not involved in this area. It was recognised by the mine that T&PC personnel had limited experience in gas analysis, monitoring, ventilation simulation and mine fire analysis.

An assessment of risk of the toxicity of the carbon monoxide (CO) concentration in the underground roadways was based on the displayed values obtained from the CO
Photograph 4 & 5 - two walls in the IMT room, note IAP form and black emergency response folder.

sensors, i.e. 50 ppm. The NSW MRS Emergency Preparedness text (Mines Rescue Service New South Wales 1999) was consulted to evaluate the hazard of the CO. This reading actually meant that the CO sensors had reached the limit of their range and in fact the concentration was much higher. Thus it was erroneously determined that the CO concentration was not a hazard to the workers.

Planning evaluated scenarios and potential ventilation changes to clear smoke from development headings. They identified that closing ventilation doors on P2 and P3 would help.

**Information Collection and Dissemination Process**

There was little evidence of any systematic information or dissemination process. This may be because this function was not included in the T&P duty card responsibilities. The absence of systematic information collection and dissemination was a problem during the exercise. For example, It was clear that no one in the incident management team, knew what the state of the fire was until it was out.

Initial attempts were made to utilise large scale forms attached to the walls of the IMT room but there were abandoned.

There were a number of inconsistencies in the documentation supplied: for example: inconsistency in the labelling of the key roles between the duty cards and those functions listed in Element 2.14 EMERGENCY RESPONSE PROCESS exists. The IAP label was used for two different documents hanging on the walls of the IMT as well
as in the books used by the Incident Controller and each controller (see photographs 4, 5 & 6). It is usual for the IAP to refer to a unique document. The MEMS standard SITREP – situation report form is not part of the NUG emergency response process.

There is confusion over the truck driver – the Operations log shows that at 6:05 pm they were searching for driver, yet at 6:00 pm Tony Jones is recorded as being driven to the surface on stretcher. At 6:30 pm rescue team checked truck and no driver found. Not until 8:00 pm record of Tony Jones being identified as truck driver. Audit of vehicles entering and leaving pit does not identify the fuel truck has ever having entered pit – information given to exercise management team was that the truck would go straight into the pit without logging in or notifying control.

In the IMT room and the Planning areas there were folders of maps and associated emergency information. These were not accessed during the incident.

**Doug White – Assessor/Observer**

I was present with the Ventilation Officer (VO) from 16:46 to 16:58.

No one was appointed to the VO position (but the VO appeared as if by magic)

The Ventilation Officer arrived in the Control Room and spoke with the Underground Mine Manager. The Ventilation Officer then left the Control Room and made his way to the Development Coordination room and discussed the state of readiness of the Opencut Rescue Team.

He then organised security to be posted in the slot (2x Tech Services). The Ventilation Officer then discussed the mine environment with the Underground Mine Manager at screen in the Tech Services area.

**Operations Room (Doug White)**

I found the operations Control Room at 17:38 and stayed there until the end of the exercise. (leaving only for a moment to shadow the Rescue Coordinator who led me to yet another room where I found the Logistics Control Room. I left Jacques le Roux (assessor) to observe the Logistics Control Room)
Again there appeared to be quite a number of people readily available at such short notice. Would this have been the case in a real emergency where persons were not on standby?

**What worked well**

- The elements of this exercise that worked well are not part of the IMT and information evaluation process.
- The E/IM did establish the objectives early.
- The E/IM IAP book had duplicate pages that allowed for each key function area to receive copies directly from the IMT meeting.
- Well organised Tech Services area
- Good communication between Ventilation Officer and Underground Mine Manager
- Operations room was very well organised. Each person in the room had a position and understood their duty
- Communications strategy between areas was well managed with one person nominated to keep the IMT informed at regular intervals.

**Points for Consideration**

- How effective would the IMT process and incident control have been had the opencut fire team not been doing training at the time of the incident and therefore not immediately available for action?
- How effective would the incident management have been had the key members of the IMT not been readily accessible?
- What would the mine have done in these circumstance where the fire had become established in the underground workings particularly the belt drift?
- How adequate would the ventilation modelling be without information on status and location of fire?
- Would the informal incident management approach have been effective if the exercise had been more complex or taken longer to control?
- VO relied heavily on an outside contractor to confirm his actions
- Would so many Tech Services people ordinarily be available on a Friday afternoon?
- It appeared that there was more interest in the state of the portal than getting the crew out
Recommendations

Mine

- The mine should undertake an evaluation of the effectiveness of the emergency response system – planned versus actual for adequacy, including the need for more formal information management processes.

- ICS – the personnel need to be trained in the functions required for the ICS system to work. This training relates not only to the functions of an individual but also to the recognition of the roles and responsibilities of others and the appropriate interaction mechanisms.

- The mine should ensure that there are sufficient persons available with suitable ventilation and gas experience to assist in the IMT process at all times.

- The mine should improve the reliability of the mine tracker system so that it can assist in the monitoring of the location of persons underground.

- The mine should evaluate the adequacy of the emergency preparedness system for robustness and not rely on the availability of one or two key personnel.

- The alarm protocols on the mine SCADA system should be improved to flag the TARP involved and what level of the TARP has been triggered. It should be possible to link the alarm to the TARP electronically and thus provide a quick prompt of required actions by CRO and senior mine officials.

Industry

- More intelligence needs to be applied to the display of gas alarms. When analysers reach full scale, monitoring systems should recognise this.

- The collection and dissemination of information remains an issue that needs to be addressed in emergency response plans and associated documents.

- Mines should review the use of forms to ensure that they are appropriate for the designed function. Filling out unnecessary forms can take time that would be better occupied in other functions.

Exercise Team

- When a fire is simulated there needs to be close communication between assessors at the fire site and the surface assessors. Any change in fire status, as determined by those monitoring the effectiveness of the fire fighting, can be relayed to the others to allow for changes in the scenario.

- Assessors at the fire site must have control over the fire characteristics. There needs to be good communications capacity between the various assessors.

- The scenario should be as realistically simulated as possible. The use of smoke generators etc should be considered.
MEMS

Assessor: Marek Romanski

My involvement with the Level 1 Exercise at Newlands Northern Underground mine included observation of the activation of Mine Emergency Management Systems (MEMS). It involved initial observations made in the surface Control Room (CR), following the Incident Controller and partly assisting the other Assessor at the Operations Room.

Objectives were to observe and test the systems and response to the prearranged emergency exercise.

To accurately produce timeline events log, the whole exercise has been recorded.

Prior to the commencement of the exercise at 15.15, I recorded all the names from the Tag Board located in front of the Control Room at the entrance to the colliery surface offices.

The following were found:

- LW Panel had 8 people, six being Newland’s employees and two being contractors from Titan Mining and Minerva.
- P4 Face Zone Development Panel had 8 Newland’s Employees.
- Input Ramp and Stockpile Belts had 7 people, four being contractors, two Newland’s Employees and one Newlands Southern U/G employee.
- Surface, Fans, Compressors had 11 people one being a contractor and ten being Newland’s Employees.
- Surface Buildings had 7 people.
- Total workforce on the mine site was 41 people.
- At 16.00 a second audit revealed that P4 remained unchanged, LW changed from 8 to 9, Input Ramp and Stockpile Belts remained the same, Surface, Fans, Compressors changed from 11 to 9 and Surface buildings changed from 7 to 10 people with Mine Manager being a new tag (placed sometime between 15.15 and 16.00)
- The exercise commenced 16.20 on Friday Afternoon.
- The combustion products of the fire at P4 Portal activated the alarms within two minutes of the commencement of the exercise.
- Exercise completed at 20.10.
What worked well

- Control Room facilities well setup.
- Correct (according to site TARPs) response to the alarms from CRO,
- Efficient callout and quick response of additional mine staff to help with emergency (would this have occurred on a normal Friday afternoon if people were not on standby for the level 1 exercise?),
- Efficient response from neighbouring opencut Mine rescue services,
- Correct notification to the Department of Mines and Energy and IHSR's (what is this – not in glossary) in as much as the mine contacted them as required under legislation but they failed to use the DME emergency number (07 3237 1696),
- Correct notification to outside agencies (QMRS, fire brigade, ambulance),
- Correct notification to company head office,
- Clear objectives were laid out to IMT Team.
Points for Consideration

- Only one phone conversation at a time should be allowed in the CR to avoid communication issues
- Tag Board should have a person allocated to account and keep record of all personnel on the mine site,
- Clearly define each role of the management during an emergency,
- Provide regular updates of the situation to all groups on the mine site.

Recommendations

**Mine**

- Follow the documentation provided in the mine’s PHMP – e.g. utilize forms provided in the duty cards for recording information
- Follow the process as outlined in site PHMP and associated documentation e.g. improve timing in formation of IMT,
- Improve communication processes between each IMT response group e.g. utilize site email system, usage of site audio system, appointment of people to communicate between each group.
- Consider location of the groups closer to each other.
- Consider changing venues if the conditions become unbearable (e.g. broken A/C in operations room).
- Consider utilization of aids already on the mine site (Stench gas).

**Industry**

- Revise procedures regarding number of people and locations on the mine sites,
- Revise response to emergency on the surface whilst nearly all personnel are below ground and few if any are available on the surface.
- Revise and run mock-up exercises following your site documentation. This will highlight unnecessary complexity of the system which should be modified for all to understand,
- Be aware that help may not be readily available at certain times and locations. Revise your response systems to allow efficient response.
**Exercise Team**

- Clearly define the roles of the assessors. Provide training in assessing emergency response prior to the exercise.
- Encourage the use of the same auditing tools in all areas of the exercise,
- Do not use site employees for roles in the emergency, and if no one else, make sure they are clearly marked as being a part of the exercise.

**Fire Fighting and Patient Treatment**

**Assessors: Mark Freeman, Jim Finch, Seamus Devlin**

The exercise consisted of response to an overturned fuel carrying vehicle at the entry to Portals 3 & 4.

Response was triggered by the arrival and reporting of the incident by two outbye deputies and the observation of the incident on cameras reporting to the Control Office.

The response by the opencut fire team was prompt and efficient.

The manner in which they attacked the fire, with water and low expansion foam, would have resulted in the fire being brought under control rapidly.

The use of the water truck’s monitor (suggested and requested by the team) would
have ensured the surface portion and in all probability the underground fuel fire, would have been put out promptly.

There was some delay in searching the area for the driver of the truck.

Some entry control seemed to be required at the ramp ASAP.

Some advice to the opencut response team would be necessary in relation to decisions considered after the fire was under control – at one stage there was some thought as to closing the ventilation doors.

Treatment of the casualty was sufficient to maintain life although there seemed to be some lack of clarity in the communication request for an ambulance to be despatched to the site (not sure whether this was to be an internal or QAS).

The fire monitoring, post the event, and the search of the site was conducted very efficiently.

What worked well

- Opencut rescue team was prompt in responding to the fire site. The opencut team conducted an effective search, patient treatment and fire fighting at site.
- All fittings on the water truck were compatible
• Opencut team conducted secondary search of the area to ensure that the patient that had been recovered was the truck driver and that there were no other patients.

• The opencut captain asked to use the opencut water truck monitor to apply foam on the fire.

• The opencut team were aware of the water use from the water truck and wished to start filling from pit water running down ramp.

• Opencut team organised relief team to take over as well as back-up equipment to restore the response vehicle.

Areas for Improvement

• Priority should be given to the preservation of life. If a vehicle is involved in an incident such as this then a driver would be involved.

• No fire fighting hydrants are available conveniently at bottom of the ramp out of the high risk areas. The fuel storage area has only minimal fire fighting equipment.

• Vehicle movement at site was excessive and did not appear to be controlled until later in the incident.

• Fire fighters should be aware of the relief that is available from the effective use of fog nozzles to protect from the radiant heat.

• Communication regarding the ambulance arriving at site caused major delay in dispatching of patient to medical assistance at top of ramp.

• No adaptors for Minsup to QLD round thread held on the opencut emergency response vehicle.

• Determination should be made as to who has relevant control of areas in such incident (particularly when underground operations are affected). The opencut emergency response team or ERZ controllers?

• Radio repeater is recommended at top of the low wall to ensure adequate communication to all parts of the cut.

• Opencut emergency response radios need to be able to communicate to UG Control Room.

• Location of the portal phone needs to be addressed to ensure that effective communication can be maintained (air velocity and vulnerability to damage).

Points for Consideration

• Placement of fire hydrants for adequate response to this area.

• Establishment of command hierarchy in a situation requiring UG knowledge.

• Confirm and action requests for medical assistance.
• Radio communication would have enhanced control and instruction between the ramp bottom and the UG Control Centre.

• Standardisation of fire fighting appliances between opencut and UG.

• Availability and use of UG trained personnel to continue search, entry and fire fighting into the portals, if required.

**Recommendations**

**Mine**

• Recommend risk assessment of fire fighting capabilities in the ramp, consider relevant areas of:
  
  • Fire hazards
  
  • Accessibility to locations of hazards
  
  • Location of fire fighting equipment in relation to hazards
  
  • Fire fighting from a place of safety
  
  • Compatibility of fire fighting fittings

• Review communications at site, in particular:
  
  • Ability to communicate to all places in the ramp via radio
  
  • Ability to communicate to the OC emergency response teams
  
  • The effective phone communication at the portals

• Conduct gap analysis of emergency response training
  
  • Review fire fighting and medical refresher training for both surface and underground rescue members

**Exercise Team**

• Consideration should be given to the duration of the fire fighting activities in consultation with the fire fighters’ assessors.

• Communications between the site assessors and the Control Room assessors needs to be confirmed before the exercise.

**Logistics**

**Assessor: Jacques le Roux**

Before the assessor arrived the log indicated the following:

Arranged for water and CABA’s to be delivered and arranged accommodation and meals.
Arranged lighting plants at P3 portal.

Arranged radio's for security at 17:45.

Truck driver reported missing to security at 17:45.

Lighting plants arrive at 18:05.

Doctor put on standby indicated availability within 12 minutes.

Took water bottles down to Ramp 4.

Arrived in logistics room at 18:05 after underground evacuation.

Five personnel were active in the logistics room, including a scribe and the Logistics Controller.

An employee entered and inquired where the rescue room was at 18:10.

Vehicles were dispatched and allocated. Permission was sought from the OCE at 18:12 to run vehicles from Ramp 5 to Ramp 4, he was requested to let Brambles, the coal haul company, know that light vehicles with no flags, only flashing lights, will be using the route.

Looking for a mechanical tradesperson to be put on standby.

Instruction was given at 18:17 by Allan Green, that everyone who goes to Ramp 4 needs authority from IMT.

18:18 Adam Austin indicated that the perimeter is secure and each security station has radios and torches.

Two additional resources arrived to assist logistics team at 18:20.

Unlocked stores and left stores vehicle at No.5 security station. Some confusion as to which security station is which. Not marked clearly on map, but indicated in procedures.

18:25 The request was made to check lights and rescuers and see how many booked out.( Lamps were not taped off until 18:45.)

18:26 Decision made to use a separate office as a counselling room. Counsellors were called and they indicated that someone could be deployed from Mackay.

18:40 Security report that gate at Ramp 6 and highwall is locked and all security stations are manned. People going through gate report to security controller and then to IMT.

18:40 The fire is out at the truck but P3 belt not isolated. A person was sent to isolate the belt.

18:55 Uncertainty about identity of truck and driver. Truck companies were contacted in order to identify the truck.

18:58 Personnel tally feed back, 61 Newlands personnel on-site and 19 Assessors.
18:59 Feedback received that P3 is isolated

19:07 Camera checks done in order to determine the truck identity.

The identity of the truck driver still not determined at 19:20.

Security update was given at 19:30 and indicated that security officers needed to be relieved. Night shift operators were being arranged as relief.

Operations still asking about identity of truck and driver at 19:30.

A strata inspection was arranged at 19:32 and an ERZ controller and Geotech employee were sent to inspect with a vehicle.

IMT considered whether religious services were required.

19:45 Still unsure about identity of truck and vehicle. Store delivery record checked to attempt to determine the truck identity.

19:50 Truck driver and truck identified.

19:55 Opencut rescue was asked to stay on fire watch and were escorted to site

Exercise suspended at 20:15 and a debriefing was held in the IMT.

**What worked well**

- The logistic team worked well as a team and was very efficient in allocating resources and arranging resources.
- Food was arranged and accommodation ready to cater for an extended emergency.
- Updates were done after IMT meetings which were held on the hour every hour.
- Was well resourced with a total of 9 people ending up in the logistics team and they demonstrated the appropriate skills required to conduct their duties.

**Areas for improvement**

- IMT written instruction books were used as a log rather than an instruction instrument. This resulted in instructions not being formally recorded.
- The wall chart was available but list of resources was started on the whiteboard at 18:25. and then two lists was used the whiteboard and wall chart that was only started to be used at 18:40.
- Lamp control was poor with lamp audit only completed at 18:45.
- Security station staff were unclear on duties and it took too long to get security in place.
• Radio dead spots on surface effected effective communication.
• Map of locations of IMT areas should be available upon arrival of personnel.

Recommendations

Mine
• Secure site immediately. (Man security points).
• Practice the use of available resources in IMT rooms e.g. wall charts etc.
• Incident controller did not move between teams, this resulted in information being lost and IMT making decisions on limited information. Suggest that between formal IMT meetings the Incident Controller moves between teams both to gather information and keep the teams abreast of the current details he has to hand. This would also be an ideal opportunity to boost morale and keep spirits up that can flag over long periods.
• Ensure all instructions and decisions are formalised and recorded.

Industry
• All organisations should review the MEMS/ICS for application in emergency incident control. Key areas of interest are: discipline in adhering to the system, utilising but limiting the span of control (i.e. no greater than five particular resources per person), clear authority in authorising plans and actions and managing the communication flow.
• Process management (decision-making process, time wasting, verification of data, information flow in and out of the incident management room, briefings done on time, checking milestone events, interaction of members) remains a vital part of incident management and must always be at the forefront of the operations within the IMT.

Exercise team
• The MEMS process split up the IMT, more resources are required to monitor the process effectively.

Department of Mines Response to Emergency

Assessor Darryl Casey Inspector of Mines, Mackay Region

General Description

Today in the presence of Inspection Officer Mr Keith Brennan and Inspector Mr Darryl Casey a level 1 mines rescue was attended at the Newlands Northern Underground
Mine. The time of the incident was 16:40 Friday 7th of November, 2008. The incident involved a rolled fuel truck which was on fire outside the portal P3 located in the mine’s opencut. Smoke was drawn into the underground mine down to the longwall and development panel. A total of 16 men were underground who required evacuation. The Department of Mines and Energy recognises the need to continually review its emergency response capabilities.

**What Worked well**

Form 1B; Personal Log Part 1 Indicative Reporting Time Lines was completed.

Two Inspectors attended.

Department’s Incident controller was notified every hour (Not 2 hrs as required now).

Fatigue management for driving was accounted for.

**Points for Consideration**

Stand-by inspectors need to be available and informed.

Electronic/hard copy plans are required.

Satellite phone is required for remote areas by the “on-call” officer.

Inspectors must be trained annually in the Department’s emergency response requirements.

**Recommendation**

**Mine**

The Mine Emergency Number must be used (07 3237 1696) to inform relevant government agencies such as head office and Simtars.

**Industry**

Briefing meeting established PHMP’s including emergency response for Newland’s Underground Mine.(this is unclear) As a minimum every mine’s emergency response plan should be accessible by the Department at all times.

An electronic plan of every mine shall be available to the Department’s Incident Controller and, where possible, to all inspectors at the place of central control.

**Department of Mines and Energy**

An incident investigations kit should be carried by all inspectors or as a minimum those “on-call”.

Some knowledge of who is available for back-up/incident controller for weekends is necessary.

Resource planning (Form 1C) shall be implemented by the Department’s incident controller.
External Media Activity- Level 1 emergency exercise
Assessor: Glenis Ayling and Pauline Clayton DME Media and Communications

General

Glenis Ayling and Pauline Clayton from the Department of Mines and Energy’s Media and Communications Unit tested the Control Centre’s responses to dealing with media queries during the early, dramatic moments of the exercise.

The first few calls were made to the Control Room (two numbers) within 30 minutes of the exercise starting. Control Centre staff were busy, but polite and sounded in control of the situation. Those who answered the ‘media’ calls neither confirmed nor denied there was an ‘incident’ at the mine. (At one stage Glenis overheard someone in the background telling a control centre staffer where to find the external liaison contact number. Pauline overheard the call of “fire”.)

Both Glenis and Pauline, posing as media organisations, called the Control Centre at different times. We were asked for our name and number so someone could call back.

The first “media” call was made at 17.05 and the “media’s” name and number taken. At 17.29, James Rickhard from Xstrata public affairs had responded.

He confirmed there was an incident and that within an hour a statement would be ready.

Following that discussion, Pauline revealed she was from the Department of Mines and Energy and calling as part of the exercise media test.

When Glenis, posing as a “media” organisation, later called Newlands’ after hours number, she was given a number to ring [Xstrata public affairs]. James Rickhard then asked her if she had heard there was an emergency exercise underway at Newlands or did she believe this was a genuine incident.

She confirmed she was from DME Media and Communications Unit and was participating in the exercise. Xstrata then asked for her email and telephone number so Xstrata could keep the Department advised.

[Note: Xstrata has about 30 exercise simulations a year in all their operations.]

Overall, Control Centre staff acted appropriately and Xstrata management acted fast and efficiently.

A genuine news editor would accept this response.

The exercise coordinator let both DME media staff know by SMS when the exercise had finished.
What worked well

Control Centre staff was polite and directed media callers to a number that could assist them but they did not say who that number was.

Areas for improvement

It would have been helpful if the Control Centre had told media callers who they would be ringing for further information. It turned out to be the mine’s after-hours number and callers were then directed to Xstrata public affairs mobile number.

Recommendations

DME needs to clarify who will be responding to media calls: the mine operator, DME media or the Minister’s office.

From this exercise it appeared that all media comment relating to a real emergency at this mine site would be handled by the mine operator, Xstrata, who would keep all relevant stakeholders, including the Department and government, informed.

If this had been a genuine disaster, media outlets would be camped outside Newlands’ main gate wanting to interview staff and anyone they could.
Conclusions

- CABA enabled the ERZ controller to communicate and brief his crew as well as inform the CRO of his status and intended evacuation route.
- All members of the evacuation crew took the exercise seriously and received valuable insight as a result of their involvement.
- The “buddy” approach was evident all the way through the exercise and can be clearly seen in the video footage where personnel donning SCSR/CABA are being assisted by other members of the crew.
- Clear communication was made inter-team (is this intra-team?) and to the surface with evacuation milestones being set.
- Blind men sticks were used to keep the crew together during the evacuation.
- Care for the injured man/casualty management was very good.
- Unexperienced workers at Newlands Northern underground wear a yellow reflective vest which made it easy for the ERZ controller to identify them in low visibility.
- The ERZ Controller made a number of effective decisions and stuck to them providing good leadership to his crew.
- The CRO maintained composure throughout the exercise.
- The CRO sent PED messages to update crew underground and to lift morale.
- There was minimal unnecessary communication out of the Control Room.
- Non-verbal communications between the CRO and underground personnel were effective although there were some problems with communicating the number of personnel.
- Identification that the tubes had burnt through and were all monitoring from the same location in the P3 portal.
- Out-by deputy performed really well in early stages in organising fire fighting equipment on surface.
- Surface fire team deployed quickly and performed well
- Good control of Rescue Station by duty card holder
- Timely response time from local QMRS brigade members
- The E/IM did establish the objectives early.
- The E/IM IAP book had duplicate pages that allowed for each key function area to receive copies directly from the IMT meeting.
• Operations room was very well organised with each person in the room having a position and understanding their duty.

• Communications strategy between areas was well managed with one person nominated to keep the IMT informed at regular intervals.

• OC rescue team was prompt in response to site. The OC team conducted effective search, patient treatment and fire fighting at site.

• All fittings on the water truck were compatible

• The OC captain asked to use the OC water truck monitor to apply foam on the fire.

• OC team organised relief team to take over as well as back-up equipment to restore the response vehicle.

• The logistic team worked well as a team and was very efficient in allocating and arranging resources.

• Food was arranged and accommodation ready to cater for an extended emergency.

• NMA (Nominated Medical Advisor) attended and performed well.

• Co-opted person in Control Room performed well.
Recommendations

Mine

- P4 development crew should brief the remainder of the mine including the management on their experiences during the evacuation including:
  - Wearing of SCSR
  - Low light evacuation
  - Communication process (instructions re evacuation routes including being sent to wait at a location where there was no telephone)
  - Non-use of the vehicle

- Improvement is needed for sign posting from Ramp 4 to Muster Area.

- A more structured and better resourced people control and tracking mechanism needs to be in place for the crews while UG and when they exit the mine.

- Train people to take emergency equipment (i.e. blind man sticks and first aid kit) with them during escape.

- Ensure radio coverage in all areas of surface operation.

- Encouraging mineworkers to assist each other in the fitting of CABA suits needs reinforcing.

- Two operators had problems with CABA straps when fitting the suit – the mine should check their suits

- Suitably trained/experienced personnel to be available as Back-up Controller.

- Improved briefing of oncoming CRO.

- Screen external calls coming into Control Room during an incident.

- Review radio communications in Control Room. Radio communication channels/bands listing for site-wide communication

- The mine should review its policy regarding communication of an incident to underground personnel - Standard messages such as “call control on 363”: should not be used in an emergency. Suggest use “Emergency Call Control”.
• Mines that are relatively isolated from their mutual response mines should have sufficient QMRS brigadesmen trained to enable deployment of teams in a timely manner OR first response systems need to integrate use of site rescue personnel to ensure highly trained rescue persons are not a wasted resource.
• Regular and timely updates of current status of incident should be given by IMT to key areas and personnel including Rescue Station / teams and CRO
• Debriefs are critical after the exercise. The mine should review SHMS. This review should be conducted by the mine as soon as practicable and should include the opencut and underground mineworkers and both mines’ systems should be reviewed.
• Where underground mines utilise surface rescue teams for response these teams should be familiarised with areas, equipment and systems. These teams should be allocated by the controller who has knowledge of the relative hazards and area of the underground mine relative to the incident.
• Actions and decisions made outside the IMT must be recorded and relayed to the IMT.
• Availability of escaping crews to talk directly to IMT representative for two way communication on appropriate escape routes
• Where surface rescue teams are using turn-out gear to fight fires for extended periods sufficient persons should be available to enable changeover due to fatigue and exhaustion.
• Timely action and tracking of IMT action requests
• Easy identification of clean skins should be considered as a way for persons leading an evacuation to allow them to assist or check these mineworkers. (uncertain what is meant here)
• Need to establish communications at incident site to enable contact with operations or logistics etc
• The mine should undertake an evaluation of the effectiveness of the emergency response system – planned versus actual for adequacy, including the need for more formal information management processes.
• ICS – the personnel need to be trained in the functions required for the ICS system to work. This training relates not only to the functions of an individual but also to the recognition of the roles and responsibilities of others and the appropriate interaction mechanisms.
• The mine should ensure that there are sufficient persons available with suitable ventilation and gas experience to assist in the IMT process at all times.

• The mine should improve the reliability of the mine tracker system so that it can assist in the monitoring of the location of persons underground.

• The mine should evaluate the adequacy of the emergency preparedness system for robustness and not rely on the availability of one or two key personnel.

• The alarm protocols on the mine SCADA system should be improved to flag the TARP involved and what level of the TARP has been triggered. It should be possible to link the alarm to the TARP electronically and thus provide a quick prompt of required actions by CRO and senior mine officials.

• Recommend risk assessment of fire fighting capabilities in the ramp, consider relevant areas of:
  o Fire hazards
  o Accessibility to locations of hazards
  o Location of fire fighting equipment in relation to hazards
  o Fire fighting from a place of safety
  o Compatibility of fire fighting fittings

• Review communications at site, in particular:
  o Ability to communicate to all places in the ramp via radio
  o Ability to communicate to the OC emergency response teams
  o Effective phone communication at the portals

• Confirm and action request for medical assistance as a priority for emergency

• Conduct gap analysis of emergency response training
  o Review fire fighting and medical refresher training for both surface and underground rescue members

• Secure site immediately. (Man security points).

• Practice the use of available resources in IMT rooms e.g. wall charts etc.

• Ensure all instructions and decisions are formalised and recorded.

• Analyse numbers required on the weekend to handle any emergency
• Address failure of air conditioning in Operations room
• Medical assistance should be sought as a priority to allow better decision making within IMT re injuries and casualty management.
• All persons assigned a duty card should wear the appropriate vest. Newlands personnel may know who people are but outside services most likely will not.
• If this event had occurred on a normal Friday evening and people were not on standby, would there have been enough personnel to manage the incident?
• Given nearly all staff were on-site, would there have been sufficient personnel remaining to manage the situation given the persons on-site were nearing the maximum time in the operations fatigue policy? Consideration should be given to husbanding resources to sustain effective incident control should the incident extend for a number of hours.

Industry

• Training in donning and use of self contained self rescuers needs to be addressed as indicated by previous level 1 mine emergency exercises, and highlighted in recent forums in the United States of America. It is recommended to industry that a similar competency based training regime to that proposed by the United States mining industry (at refresher intervals of 3 months) be implemented as well as ensuring that all mine workers have used a real self contained self rescuer or a training rescuer that has simulated heat and resistance capabilities.

Such training MUST emphasize that talking whilst wearing SCSRs may be fatal in atmospheres containing noxious and toxic gases.

It is recommended that some of the mine workers who wore real SCSRs assist in the development of a presentation for all other mine workers on-site on the experience and effects of wearing a SCSR in limited vision. (Note: This is the same recommendation as appeared in 2006 & 2007 level 1 exercise reports).

Not only should training in the use of self contained self rescuers be reviewed, but also the option of installing “changeover” stations, or equivalent, where escaping mine workers can change over the self contained self rescuer in a less hazardous atmosphere, communicate with surface and also have the option of remaining in the station for a period of time.
Industry needs to define the requirements for aided escape, i.e. how will injured/incapacitated personnel be dealt with. Completion of Fight or Flight group seminars.

Evaluation of options for fitting wheels to stretchers/stokes litter.

Whenever possible mine workers should utilise underground transport for evacuation purposes.

The protocol by which mineworkers using SCSR’s for self escape, having reached a place of safety, can then offer first response duties – needs industry discussion and development.

All mines should modify their emergency response plans to contact the Queensland Mines Inspectorate via the emergency number, (07 3237 1696). This means that the Queensland Mines Inspectorate emergency response can start immediately.

Off-scale readings on the tube bundle should trigger immediate bag sample collection. There is slow response in obtaining and analysing bag samples.

Look at “text messaging” possibilities for underground phones.

Awareness of maximum concentrations that can be measured on mines monitoring systems.

Have an experienced CRO(s) or trained person on standby who can assist the duty CRO(s) throughout any incident.

Monthly leak checks (Australian Standard AS2290.3 - Standards Australia 1990)) and determination of draw times for each tube for tube bundle system.

Monitoring and logging of vacuum pressures for each sample tube to identify any compromised tubes.

Screen external calls coming into Control Room during an incident.

Look at improved ways of logging incoming and outgoing communications during an incident in Control Room.

Review radio communication channels/bands listing for site-wide communication. Review radio communications in Control Room to ensure adequate coverage of all channels operating across site.
• Where CABA is used for first response, a system for re-hydration be investigated and implemented.

• More intelligence needs to be applied to the display of gas alarms. When analysers reach full scale, monitoring systems should recognise this.

• The collection and dissemination of information remains an issue that needs to be addressed in emergency response plans and associated documents.

• Mines should review the use of forms to ensure that they are appropriate for the designed function. Filling out unnecessary forms can take time that would be better occupied in other functions.

• All organisations should review the MEMS/ICS for application in emergency incident control. Key areas of interest are: discipline in adhering to the system, utilising but limiting the span of control (i.e. no greater than five particular resources per person), clear authority in authorising plans and actions and managing the communication flow.

• Targeted research should be carried out to establish optimal spacing of CABA recharge station considering the higher air usage if injured workers are carried to safety, and workload and condition of workers prior to the emergency.

The following in italics are from previous industry reports and are still valid as evidenced in this exercise—

• It is important that there is provision for communications out of the Control Room as all stakeholders must be kept regularly briefed on currency and status of events.

• It is recommended that IMT is to directly brief anybody being dispatched from the surface (mines rescue fresh air base personnel, transport drivers, mines rescue teams, etc) or at least be present during the briefing.

• It is recommended to allocate a person as surface coordinator to oversee all of the surface tasks, movement of personnel in and out of the mine and liaison with IMT.

• The control, allocation and updating of the deployment and availability of resources is a vital function of a coordinated emergency response and cannot be overlooked.

• It is recommended that a forum of stakeholders be urgently established to develop and implement a set of protocols covering the interactions between mine site first
response teams and external aided-rescue organizations. Each of these practices provides specialist but separate skills and resources and it is vital that the issues involved in their interactions be identified and coordinated. There is little doubt that CABA teams will increasingly form part of emergency response capabilities in our industry and we must be prepared.

- There needs to be a review of the number of brigadesmen that the mine can supply at any time of the day or work roster. This could also be expanded to other mines in the mutual assistance group.

- Consideration is to be given to review the minimum number of mines rescue trainees
  - with most people working 12-hour shifts this effectively reduces the number of trainees available to respond by half (fatigue related policies), also with people choosing to live remote from mining areas response times/availability of trainees is prolonged.

- Protocols on how mines rescue trained personnel on-site are to be utilised should be developed. This can take into account the type of emergency, number available and specific duty card or other specialized needs.

- Process management (decision-making process, time wasting, verification of data, information flow in and out of the incident management room, briefings done on time, checking milestone events, interaction of members) remains a vital part of incident management and must always be at the forefront of the operations within the IMT.

**Exercise team**

- Confusion arose over the identity of the injured truck driver, as a Newlands Northern employee was used to play the role of a contractor driver. Future casualties in exercises should utilise personnel from other workgroups to eliminate potential confusion and make the scenario as realistic as possible.
Appendices

Appendix A: Detailed Exercise timeline
Appendix B: Previous recommendations
Appendix C: Management team/assessors
# Appendix A: Exercise timeline

## Table 2: Detailed timeline for the exercise

<table>
<thead>
<tr>
<th>Location</th>
<th>Surface observation</th>
<th>Time</th>
<th>Underground Observation</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Room</td>
<td>Development panel was called.</td>
<td>1620</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Development panel was PEDed.</td>
<td>1626</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO looked at TARPS</td>
<td>1627</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO called Level 1</td>
<td>1628</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO sent down 2 deputies to look at problem</td>
<td>1629</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1630 PED received in development panel</td>
<td>1630</td>
<td></td>
<td>Development Panel</td>
</tr>
<tr>
<td>Control Room</td>
<td>LW Supt was called</td>
<td>1631</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>SSE called</td>
<td>1632</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1633 Outbye deputies arrived at site of fire.</td>
<td>1633</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO had visual on fire</td>
<td>1634</td>
<td>Development crew called control - 1st attempt engaged, 2nd attempt got through</td>
<td>Development Panel</td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO called Level 3</td>
<td>1637</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO turned on strobe lights</td>
<td>1637</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO receives verbal report on status of fire</td>
<td>1639</td>
<td></td>
<td></td>
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<tr>
<td>Control Room</td>
<td>SSE and LW coordinator entered Control Room</td>
<td>1639</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1639 Outbye deputies reported verbally on fire to CRO</td>
<td>1639</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>SSE and LW coordinator entered Control Room</td>
<td>1639</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>SSE asking CRO to get people together for IMT.</td>
<td>1639</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Surface rescue team was activated.</td>
<td>1640</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1640 Maingate operators contacted by control for ‘deputy to contact control immediately’</td>
<td>1640</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>SSE initiates IMT process</td>
<td>1642</td>
<td></td>
<td></td>
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<tr>
<td>Control Room</td>
<td>General evacuation PED sent</td>
<td>1644</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>1644 Deputy telling CRO to turn off belts and assemble fire fighting team</td>
<td>1644</td>
<td></td>
<td></td>
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<tr>
<td>Control Room</td>
<td></td>
<td>1646</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1646 Outbye deputy readied EIMCO and firebox</td>
<td>1646</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td></td>
<td>1649</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1649 Development team change over from SCR's to CABA</td>
<td>1649</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td></td>
<td>1650</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Surface observation</td>
<td>Time</td>
<td>Underground Observation</td>
<td>Location</td>
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<td>---------------</td>
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<td>-------------------------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Room</td>
<td>(Titan ?)</td>
<td>1650</td>
<td>All LW employees at LW crib room</td>
<td>LW Crib Room</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1650</td>
<td>Outbye deputy kept fitter on surface</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1650</td>
<td>Development deputy trying to communicate with CRO - difficulties with comms.</td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>VO appoints 2 sentries to go halfway down slot.</td>
<td>1650</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO no speak comms with Development team confirming number of people - issues with no speak comms, advised to stay under air.</td>
<td>1652</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>SSE advises GM Xstrata and activated Xstrata crisis management process.</td>
<td>1652</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1654</td>
<td>LW deputy contacts control from LW crib room.</td>
<td>LW Crib Room</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1655</td>
<td>EIMCO driver leaves surface without firebox.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1655</td>
<td>Smoke at longwall, LW crew don oxygen.</td>
<td>LW Crib Room</td>
</tr>
<tr>
<td>Control Room</td>
<td>SSE contacts ISHR</td>
<td>1655</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>SSE attempted contact Mines Inspector</td>
<td>1657</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Surface mines rescue services arrive</td>
<td>1657</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>SSE requested a tag board check.</td>
<td>1658</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Surface mines rescue truck requesting escort.</td>
<td>1658</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Surface mines rescue truck leaves car park.</td>
<td>1659</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Media call</td>
<td>1700</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO advises SSE that they do not have enough of their own rescue personnel on-site, suggesting call up of additional external resources.</td>
<td>1700</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Minibus with 4 surface rescue personnel arrives.</td>
<td>1702</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firesite</td>
<td>Surface rescue truck arrives at firesite.</td>
<td>1703</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1704</td>
<td>Development team called CRO to inform that one man had been lost.</td>
<td>Development Panel</td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO advised that water cart coming to site, ETA in 15 minutes.</td>
<td>1707</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>SSE advises all media calls to be relayed to him.</td>
<td>1707</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface</td>
<td>EIMCO leaves surface area with firebox</td>
<td>1708</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firesite</td>
<td>Opencut rescue team has set up breathing apparatus at bottom of ramp, western side.</td>
<td>1709</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Further media call, CRO takes number and passes on.</td>
<td>1711</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO clarifying media liaison number.</td>
<td>1713</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>1713</td>
<td>LW crew leaves 21 CT using drift runner.</td>
<td></td>
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<tr>
<td>Control Room</td>
<td>SSH advises liaison officer of emergency.</td>
<td>1714</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>District Inspector calls Deputy Chief Inspector</td>
<td>1716</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Surface observation</td>
<td>Time</td>
<td>Underground Observation</td>
<td>Location</td>
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<td>--------------------------------------------</td>
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<tr>
<td>Control Room</td>
<td>Further media call.</td>
<td>1717</td>
<td></td>
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</tr>
<tr>
<td>Control Room</td>
<td>SSE talking to liaison officer.</td>
<td>1720</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Call from ramp for pit ambulance. Not</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>responded to. No pit ambulance ever arrived.</td>
<td>1720</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMT</td>
<td>SSE going back to IMT.</td>
<td>1722</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Adam Austin arrives - security at gate.</td>
<td>1724</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO advises that development team had</td>
<td>1724</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>found patient and they were heading outbye.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Control Room</td>
<td>Watertruck had arrived.</td>
<td>1725</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>SSE going back to IM.</td>
<td>1727</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>1729</td>
<td>LW crew reaches portal.</td>
<td>LW Portal</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td>IMT</td>
<td>IMT meeting started.</td>
<td>1729</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Step jump recognised in tube bundle</td>
<td>1734</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rescue Station</td>
<td>readings. CO off scale.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Substation coordinator Duty Card 5 arrives at Rescue Station.</td>
<td>1735</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Tube bundle system identified as</td>
<td>1735</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firesite</td>
<td>inoperable.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firesite</td>
<td>Low expansion foam successfully applied to</td>
<td>1737</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>fire.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>2 ISHR entered Control Room.</td>
<td>1740</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firesite</td>
<td>Delivery of foam to opencut - assumption</td>
<td>1744</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firesite</td>
<td>that fire under control/out.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firesite</td>
<td>Captain of fire team contemplated closing</td>
<td>1745</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ventilation doors to limit fire and smoke</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>entering portal.</td>
<td></td>
<td>Development personnel taking off SCSRs</td>
<td>Development Panel</td>
</tr>
<tr>
<td>Firesite</td>
<td>Person posted to P1 portal with CABA to act</td>
<td>1745</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>as sentry</td>
<td></td>
<td>Development electrician became ill at 11 CT.</td>
<td>Development Panel</td>
</tr>
<tr>
<td>Control Room</td>
<td>PED to LW deputy that OCE will pick up</td>
<td>1746</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>crew at Ramp 4.</td>
<td></td>
<td></td>
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<tr>
<td>Control Room</td>
<td>Media call</td>
<td>1747</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMT</td>
<td>Additional IMT</td>
<td>1747</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Surface Security assigned</td>
<td>1747</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Truck driver evacuated to staging area.</td>
<td>1747</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>informal discussion on closing isolation</td>
<td>1747</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>doors.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Truck driver still missing - confusion</td>
<td>1748</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>continues.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>LW crew arrives at Control Room.</td>
<td>1749</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Surface observation</td>
<td>Time</td>
<td>Underground Observation</td>
<td>Location</td>
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</tr>
<tr>
<td>Control Room</td>
<td>CRO speaking to Development team - CRO telling crew that fire not under control</td>
<td>1749</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ramp 5 security passed by 3 LW crew no comms between parties.</td>
<td>1750</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface</td>
<td>3 LW crew reach surface go-line.</td>
<td>1751</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Mark Kristen and Shaun Wilson in Control Room looking at LCD screens</td>
<td>1754</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO attempting to contact fire fighting team at P3 as no cap lamps.</td>
<td>1759</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO confusion over media number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ramp 4</td>
<td>Change of sentry at ramp 4</td>
<td>1800</td>
<td>Development Deputy plus one other travelling to get stretcher and Oxyviva.</td>
<td>Development Panel</td>
</tr>
<tr>
<td>IMT</td>
<td>SSE requests doctor’s assistance from town, due to suspected CO poisoning.</td>
<td>1800</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface</td>
<td>PJB arrives on surface with injured person. Person removed from PJB and taken to 1st aid room.</td>
<td>1802</td>
<td>Phone call from Development team - advice that injured person unable to walk.</td>
<td>Development Panel</td>
</tr>
<tr>
<td></td>
<td>Ramp controller radioing incident control team trying to confirm identify of truck driver as Tony Jones.</td>
<td>1803</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface</td>
<td>Injured driver left site by QAS ambulance.</td>
<td>1804</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ramp 4</td>
<td>Drift runner parked at Ramp 4 to maintain access if required.</td>
<td>1805</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rescue Station</td>
<td>Titan contractors and 6 CABA suits plus water loaded into utility and taken to fire site.</td>
<td>1805</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMT</td>
<td>IMT reformed.</td>
<td>1806</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMT</td>
<td>IMT - Status of fire not known.</td>
<td>1806</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMT</td>
<td>IMT - formal decision made not to close isolation doors.</td>
<td>1806</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ramp 4</td>
<td>Remainder of LW crew transported to go-line muster area from Ramp 4.</td>
<td>1807</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rescue Station</td>
<td>First 2 Newlands QMRS personnel arrived in rescue room.</td>
<td>1807</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Assistant to CRO calling if ambulance coming</td>
<td>1807</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Discussion held re closing doors. Decision by SSE not to close the hydraulic doors.</td>
<td>1808</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Assistant to CRO not certain if QAS ambulance on its way.</td>
<td>1809</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO receiving fax re mutual assistance numbers</td>
<td>1809</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMT</td>
<td>IMT informs control that truck driver had left site by ambulance.</td>
<td>1812</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ramp 5</td>
<td>LW crew passing sentry at Ramp 5 - communication good.</td>
<td>1812</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Truck driver confirmed to having been taken to 1st aid room.</td>
<td>1813</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO not sure if ambulance had taken injured truck driver out.</td>
<td>1814</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Surface observation</td>
<td>Time</td>
<td>Underground Observation</td>
<td>Location</td>
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</tr>
<tr>
<td>Muster Area</td>
<td>Last LW crew at muster area, CRO notified LW crew out, IMT notified LW crew out.</td>
<td>1815</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>PED sent with update and encouraging message</td>
<td>1815</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMT</td>
<td>IMT meeting finished.</td>
<td>1821</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LW crew being debriefed.</td>
<td>1822</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>SSE wanted to check all lamps and SCSRs were accounted for.</td>
<td>1822</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO attempting to call UG mines rescue via radio, wrong channel</td>
<td>1824</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1825</td>
<td>Development ERZ controller returned with stretcher to 11 CT.</td>
<td>Development Panel</td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO attempting to call opencut via radio, wrong channel and band.</td>
<td>1826</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>SSE met with oncoming shift personnel to stay in car park.</td>
<td>1828</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operations</td>
<td>Ops group informs that fire out.</td>
<td>1828</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMT</td>
<td>Counselling available.</td>
<td>1829</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Surface rescue team requested to check truck and whereabouts of driver.</td>
<td>1830</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO advised someone going down to check fire.</td>
<td>1833</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO advised by Ops member that when truck fire was out that direct access to P3 would be possible.</td>
<td>1833</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>PED message - Surface still fighting fire</td>
<td>1834</td>
<td>Development team to CRO that Development team at CT 11, person under oxygen, others under CABA, confirmed that fire at both portals. Deputy confirms his evacuation route. Ops informed that P3 belt on fire.</td>
<td>Development Panel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1835</td>
<td>Development team left 11 CT. 6 people carrying stretcher.</td>
<td>Development Panel</td>
</tr>
<tr>
<td>Control Room</td>
<td>Oncoming CRO arrives.</td>
<td>1838</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO updates SSE on numbers underground</td>
<td>1838</td>
<td>Development crew resting at 10 CT.</td>
<td>Development Panel</td>
</tr>
<tr>
<td></td>
<td>Person collecting cap lamp numbers at Rescue Station trying to get 2 more numbers while not all lamps were available to be reconciled.</td>
<td>1839</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>First time logistics sheet used.</td>
<td>1840</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO briefing oncoming CRO</td>
<td>1841</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Still confusion over location and name of truck driver.</td>
<td>1842</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>First time lamps taped off.</td>
<td>1843</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Conversation wrt to reviewing operations cameras to establish truck runaway. No one in Control Room understood how to review videos.</td>
<td>1845</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Nominated medical advisor arrives on-site with ambulance, reports to control.</td>
<td>1847</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Surface observation</td>
<td>Time</td>
<td>Underground Observation</td>
<td>Location</td>
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<tr>
<td>Control Room</td>
<td>PED sent to Development crew - change of exit route - exit via P4 takeoff chute,</td>
<td>1848</td>
<td>Development crew at 8 CT. Realisation they could not carry injured person and reach a</td>
<td>Development Panel</td>
</tr>
<tr>
<td></td>
<td>Development crew failed to realise PED had been received.</td>
<td></td>
<td>place of safety.</td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Radio comms to opencut now operational.</td>
<td>1855</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logistics</td>
<td>Still confusion over location of and name of truck driver, Logistics attempting to</td>
<td>1855</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>contact contract trucking companies.</td>
<td></td>
<td></td>
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<tr>
<td>IMT</td>
<td>SSE contacts CRO for update prior to next IMT meeting.</td>
<td>1858</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Tech Services Manager bringing in gas bags from P1 and P2 to Control Room for</td>
<td>1858</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>analysis.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>IMT</td>
<td>Confusion in IMT as IMT not following MEMS process.</td>
<td>1904</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO commencing gas analysis with relief CRO in Control Room.</td>
<td>1905</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Assistant CRO telling oncoming CRO ???</td>
<td>1906</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fire officially extinguished.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Rescue Station</td>
<td>QMRS duty officer arrives at Rescue Station.</td>
<td>1907</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Development team arrives at 4CT highwall dips. Information provided to Development</td>
<td>1908</td>
<td>Development team went into standby at CT4.</td>
<td>Development Panel</td>
</tr>
<tr>
<td></td>
<td>team caused confusion/resentment, this was over planned route on the surface sending</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>crew back inbye.</td>
<td></td>
<td>Note: Confusion of this particular juncture over the condition of the roof at the</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>portal which translated from fire damaged roof to a roof fall.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>There is no official record of information that supports a roof-fall having occurred.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Because of this the development team was put under further unnecessary duress.</td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Assistant CRO not sure of who was on-site.</td>
<td>1908</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMT</td>
<td>QMRS Duty Officer went to IMT.</td>
<td>1910</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO checking with IMT on what instructions to provide to Development crew.</td>
<td>1912</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMT</td>
<td>IMT make call to use normal workforce to recover Development crew.</td>
<td>1912</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMT</td>
<td>IMT informs with CRO that fire is out.</td>
<td>1917</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Comms from CRO to Development crew - discussion on alternate evacuation route.</td>
<td>1918</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Still no decision made.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Comms from CRO to Development crew - stay put vehicle will be sent to collect</td>
<td>1921</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operations</td>
<td>The operations group asked for the opencut to run the footage on the cameras for the</td>
<td>1930</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>truck.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Surface observation</td>
<td>Time</td>
<td>Underground Observation</td>
<td>Location</td>
</tr>
<tr>
<td>----------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>-------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Control Room</td>
<td>CRO 1 stepped down and CRO 2 stepped up to Role of CRO</td>
<td>1931</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>Logistics requested to provide a vehicle and dispatch two persons to conduct strata</td>
<td>1932</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>inspection at P3/P4 portals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>It was noted in the Control Room that there was a fall at P3/P4.</td>
<td>1936</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>The level 1 committee can only assume it was at this point that a mis-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>communication was made that developed from an inspection of the roof, to a roof</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Room</td>
<td>fall.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMT</td>
<td>ISHR requested from IMT gas readings at shaft, it was noted that only methane was</td>
<td>1940</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>recorded.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operations</td>
<td>Ops team informed that all lamps were accounted for except for development crew.</td>
<td>1941</td>
<td>Development crew instructed by Control Room to enter return.</td>
<td>Development</td>
</tr>
<tr>
<td></td>
<td>This was passed onto IMT.</td>
<td></td>
<td>Again, the Level 1 committee is unable to confirm the source of this decision.</td>
<td>Panel</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Development crew entered by Control Room on to enter return.</td>
<td>1943</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Still confusion about truck driver. HR</td>
<td>1945</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>attempting to ensure truck driver is being looked after and family notified. SSE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>receives message that people still underground.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rescue Station</td>
<td>3 mine workers with CABA sent to a fire watch at portals.</td>
<td>1945</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rescue Station</td>
<td>2 persons sent to inspect roof at P4P5 arrive at site.</td>
<td>1945</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Development crew stands by to evacuate staging area via return.</td>
<td>Development</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Panel</td>
<td>Panel</td>
</tr>
<tr>
<td>Rescue Station</td>
<td>NMA confirm that LW crew medically OK.</td>
<td>1950</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rescue Station</td>
<td>SSE requesting gas sampling of fans.</td>
<td>1952</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rescue Station</td>
<td>QMRS duty officer returns from IMT to brief rescue teams.</td>
<td>1955</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Vehicle arrives to collect Development crew.</td>
<td>Development</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Panel</td>
<td>Panel</td>
</tr>
<tr>
<td>Rescue Station</td>
<td>2 persons wearing CABA dispatched from surface to collect Development crew.</td>
<td>2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Development crew actually picked up by crew sent to inspect the roof.</td>
<td>2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Development crew stopped for check if all personnel removed from pit.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Development crew stopped again, individual check of all personnel removed from</td>
<td>2002</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Development crew.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface</td>
<td>Development crew arrived at muster area.</td>
<td>2010</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Exercise officially concludes at 20:15
Appendix B: Previous recommendations

This appendix contains all the previous exercise recommendations and there are a number of them which have been repeated on one or more occasions.

Recommendations which are in **bold** are from the 2007 Mine Emergency Exercise at the Grasstree mine.

**Control Room**

1. CROs should be given capability to modify tube bundle sample sequence and put tubes on hold.
2. The alarm protocols on the mine SCADA system should be improved to flag the TARP involved and what level of the TARP has been triggered. It should be possible to link the alarm to the TARP electronically and thus provide a quick prompt of required actions by CRO and senior mine officials.
3. Review non-verbal question list with those underground and CRO to eliminate questions that can't be acted on and add those that would give more information, questions such as how many people are with you should be reworded to including yourself how many people are there.
4. Review the use of non-verbal communication for larger numbers, e.g. maybe use “Are you between cut-through15 to 20?”
5. Make the list of people to contact in an emergency readily accessible.
6. Make sure the emergency response plan identifies where the police will be accommodated when on-site.
7. Investigate easy and readily available methods to transfer data in an emergency.
8. Review the use of personnel locating equipment.
9. Care should be taken when releasing the names of injured/deceased personnel to the police. Mines should have a protocol in place for this.
10. All mines should ensure that they have adequate emergency phone coverage on the mine site and should install a mobile phone repeater dish on-site where necessary.
11. Look at “text messaging” possibilities for underground phones.
12. If mine site personnel are to be injured in the scenario they should be given food/extra clothing, etc. so they are looked after.
13. The computer system for the scenario should be set up on-site days prior to the actual exercise.
14. One staff member for each duty card – or cut down on number of duty cards.
15. Staff to be familiar with responsibilities on duty cards which could be assisted by making them simpler to understand.
16. Clarify the situation regarding written authority for personnel reporting underground in an emergency situation. Given that this will probably be QMRS, this should be an industry standard.
17. Reduce the number of duty cards.
18. Have duty card holders’ record their own names on a board near the duty card box in the muster area as the CRO did not have an opportunity to compile this for 75 minutes.

19. The list provided was also confusing as it listed all available duty cards not just the ones under the CRO duty card.

20. The surface marshal should coordinate the sentries, lamp room attendant and diesel attendant then report relevant information to the CRO (single point of contact avoids confusion) Rather than have an assistant CRO Duty Card this person could be the surface marshal (experience with coordinating people).

21. A camera or perhaps a manual control should be installed at the gates. The gates were of left open for 10 to 15 minutes due to CRO not knowing the remote actuator didn’t work or being busy with other tasks. (The gates were also reported as not being good enough to stop a vehicle if required.)

22. All the duty cards should have a description of what the duty is supposed to achieve as well as the specific items to check.

23. A single system of physical data transfer should be used preferably email, managed by assistant CRO (this would provide an assurance the information is received as well as accurate timeline information post event).

24. At Grasstree West some or all of the duty cards should be amended to report to the assistant CRO if ICT member is unavailable.

25. A system to transport and debrief personnel escaping to Grasstree West should be developed to rapidly take control of this resource. This would also avoid the confusion created within workers group as to their movements after escaping. It took over four hours to move these workers to Grasstree East.

26. EMT should rely on updates from ICT not Grasstree West CRO.

27. Care of the workers should be improved as it was slow and sporadic during the exercise.

28. Test CROs’ workload in Level 2 and 3 Mine Emergency Exercises to ensure their workload in an incident is not too high.

29. Check the number of duty cards to ensure that critical tasks can be managed on a back shift.

30. Test call-out systems for effectiveness - time taken to call out as well as time taken for response.

31. Implement the use of speed dial for contacting mine site personnel.

32. Use the emergency number for notifying the Mines Inspectorate rather than phone their mobile phones.

33. A more structured and better resourced people control mechanism needs to be implemented for the crews when they exit the mine.

34. All mine site personnel crews need to be briefed to start all communications with “this is an exercise”.

35. All relief CROs must get more regular exposure to the GC, perhaps running the samples once a tour, so as to keep abreast of changes with the instrument and sample introduction.

36. A system for non-verbal notification of an emergency should be developed. This may be as simple as an initial triggering of the emergency button on the phone or
a non-verbal dial up code on the DAC or phone. A protocol for this type of communication should be developed with sample questions. All questions asked should be read from a written copy so that the answer options can be reviewed against the exact question.

37. To overcome the problems with providing paper based gas monitoring data, an on-line incident simulation was used that emulated the mine monitoring system. This system known as MEMS allows for modifications of the scenario in real time as the incident changes and site personnel attempt to control the situation, with changes able to be fed to the IMT via secure communications.

38. Translation of information via the phone led to a number of incorrect calls/information i.e. gas concentration levels.

39. Formal procedures need to be introduced and personnel trained in the emergency procedures for site i.e. the use of the DAC system to indicate location underground to Control Room not recognised.

40. Key personnel need to be aware of key factors of their system such as response times and analyser ranges.

41. The supply of two-way batteries for radios for surface use is insufficient to allow long term use of the sets available.

42. IMT is to ensure that the CRO is informed of intended actions so that he can confirm actions as required. This should be done by one of the duty card holders. This way the CRO only gets information from one person in contact with the IMT.

43. Limited access to the Control Room is imperative to stop people wandering in and out.

44. An extra phone point for personnel with duty cards is necessary so as not to use the Control Room as a telephone room.

45. GC operator was useful as a backup for the CRO although he was not required to take a large number of bag samples due to the scenario.

46. Ensure that duplicate tasks are not given to duty card holders and that duty card holders stick to their duties.

47. Consider increased and more regular use of the Personal Emergency Device (PED) to send messages to trapped personnel. Short, accurate messages can often provide a moral boost and perhaps can also be used to provide advice/directions. This should be further investigated.

48. A more autonomous/automatic mechanism to identify where personnel are located underground and when they have returned to the surface would be of great value.

49. Relief duty card operators need to be fully trained in their roles, responsibilities and functions.

50. CRO (or some other delegated person) should regularly continue ringing the phone. This not only provides orientation to those people lost in poor visibility, it gives a reassurance to persons who maybe able to hear it but not respond. Regular broadcasts down the DACs could have the same effect.
Data analysis, interpretation and monitoring

1. Improve communications in tube bundle room. No modem connection exists for communication with Simtars for assistance during any incident.
2. Provide training and awareness for mine staff of the maximum concentrations that can be measured on a mine’s gas monitoring systems.
3. Have other experienced CRO(s) that can assist the CRO(s) throughout any incident.
4. Implement monitoring and logging of vacuum pressures for each sample tube.
5. Implement monthly tube bundle integrity testing and determination of draw times.
6. Install vacuum gauges to monitor and log vacuum pressures for each tube.
7. The exercise team must ensure there is greater emphasis on the need to start all communications with “this is an exercise” is needed. One of the GC operators arrived on-site and took up duty thinking that it was a real incident.
8. Include printers with the equipment brought to site.
9. Minimise the number of assessors in the Control Room during the incident.
10. The visual display of information in the communication room could be improved. Activities and options were listed with names of responsible persons. It is important that all established facts are displayed to allow each participant and new IMT member the opportunity to view the current status of the incident. The established objectives of the group should also be displayed. Another white board could be used to list activities and allocated responsibilities. These white boards should be printable to ensure a record is kept of the IMT process. A terminal with a display of the gas monitoring system should also be present in the room.
11. Install a second phone line that supports data transfer for the GC to allow modem transfer of data, and real time support from Simtars.
12. GC - The frequency of and complexity of GC training should be reviewed. In addition the number of people available per shift competent to operate the GC needs to be reviewed. It is not appropriate to expect the CRO to run the GC during an incident.
13. A systematic regime should be established for reporting and displaying monitoring information. Without systematic recording of information it is impossible to effectively brief external bodies or undertake changeover of key personnel.
14. Safegas access should be extended to each key area.
15. There should be more personnel trained in the operation of the tube bundle systems and Safegas, including all its functionalities (especially the taking of bag samples and how they can be analysed in a timely manner).
16. Consideration should be given to installing differential pressure sensors/velocity sensors to enable changes in ventilation to be accurately monitored.
17. Consideration should be given to installing further real time gas sensors – CO and O₂, at more key points in the mine to allow characteristics of mine atmospheres to be determined. This would allow personnel underground who do not have personal gas monitors to be aware of the mine atmosphere at the...
sensor location. Locations could include: escapeways, caches, belts, transformers and intakes.

18. Computer access to the mine environment monitoring system in the IMT is essential. Ventilation simulation software should also be on this computer.

19. A mine plan in the IMT should show monitoring locations.

20. Ventilation flow sensors in key roadways would enable more accurate interpretation of makes and effects of changes in ventilation.

21. Off-scale readings on the tube bundle should trigger immediate bag sample collection. There is slow response to obtaining and analysing bag samples.

22. It is recommended that the functions inherent in current gas monitoring software be explored, particularly the facility to store and retrieve documents detailing required action response plans. Such software has much to offer CROs and IMT personnel.

23. Review location of types of gas detection equipment underground in light of ability to detect changes in mine gas atmosphere.

24. Review tube response times and cycle time – reduce ballast volumes.

25. The maintenance of gas monitoring after an incident should be completed to include the redundancy of sensors and tubes/borehole back-up for sampling of key areas and communications.

26. There should be a designated role of a person on the incident control team to be responsible for accurate gas monitoring information.

27. The role of Simtars when assistance is called for should be known thoroughly.

28. Safegas system should be connected to the Control Room monitors. The absence of the Safegas system means that the trending of gases from the tube bundles and any derived indicators can only be done by hand.

29. Further training needs to be undertaken by Control Room personnel regarding AMR sensors and gas concentrations and what type of reading an unserviceable, disabled or destroyed sensor would give.

30. Gas monitoring station numbers and AMR sensor numbers need to be matched appropriately.

31. Personnel would benefit from increased training and awareness in the capabilities of Safegas software, particularly in trending of gases, especially Quick Trend; SPLUS, multiple site analysis and holds on key monitoring locations; further understanding of the separate sources of lags and delays in analysis and their cumulative effect.

32. Use “Instruction” feature of Safegas for TARP implementation and recording of actions.

33. Modify Safegas so that login time lasts for the shift duration of the CRO. CRO had to log out whenever he left the Control Room. This will reduce frustration on accepting alarms.

34. A better understanding of the operation of the tube bundle sampling regime, the capabilities of the software and the computer control system is necessary to optimise the collection of relevant information.

35. It is important that samples of gas taken are labelled with the time taken and location of sample.

36. The mine monitoring system should include a facility to print a table of the latest data for all locations with date and time of all gases and be able to export to
other programs or for email. This would allow error free transfer of data to other interested persons.

37. Ensure that GC analysis of the atmosphere is undertaken as soon as practicable. Utilise Simtars or other relevant expert for additional review and verification of gas data.

38. Mine monitoring systems should ensure that trend graphs include the latest data.

39. Mine monitoring systems should include a label of tube numbers as well as locations – mine plans only refer to monitoring points by tube number when doing trending and analysis.

40. When a monitor reaches full scale, it should read “full scale”, instead of displaying a value. The value -999 can be interpreted as actual.

41. The mine monitoring system should have the ability to display trends of more than one sample point at a time.

42. Nitrogen dioxide should not be monitored via the tube bundle system. Underground personal monitors should be used instead.

Debrief

1. Debriefing of mineworkers should be improved. A facility should exist for them to talk through the trauma of any incident.

2. All underground crews should also be briefed to ensure that they do not do anything which is unsafe and if necessary should make their place of work safe before commencement of the exercise.

3. After evacuation from Grasstree West mineworkers/contractors to be given clear instructions regarding arrival at Grasstree main muster area.

4. The exercise committee should develop alternative methods to communicate/review exercise to industry.

5. Consideration should be given to refreshing all employees as to what to do when they exit a mine in an emergency e.g. identify who they are, where they are and their physical condition.

6. Re-hydration should be identified as a key initial requirement of the debrief process.

7. Medical examinations by on-site medical personnel should take priority over debrief and that such examination should include objective medical observations of these persons (e.g. pulse, blood pressure, physical examination). If absolutely necessary, debrief/gathering of critical incident information could occur whilst such examination is occurring.

8. Debrief sessions must be structured with adequate resources, such as mine plans and question prompts sheets to facilitate accurate and complete capture of information.

9. There needs to be a formal debriefing procedure in place, including a scribe to record all information to ensure that there is no lost information, wrong conclusions and poor recording.

10. All personnel being debriefed need to be made comfortable, provided with adequate food and drink and given first aid as needed.
11. Security needs to be placed on debriefing rooms to control who enters and exits the room.

12. It is essential that identification of any casualties be verified and accurate prior to the release of information to outside parties.

13. Review debriefing procedures – suggest a prompt sheet be developed and/or utilised.

14. Training personnel available to debrief persons after they evacuate the mine. The knowledge evacuees have is vital to the IMT.

15. Information from debriefing sessions to be incorporated into the decision making process e.g. the operator of the vehicle may have provided useful information to assist that decision making process (the fire was relatively small, the fire was actually 20m inbye 9 cut-through). Critical witnesses should be identified and also debriefed by IMT so that they can get a better understanding of underground conditions.

**Emergency initiation**

1. It is recommended that the Mines Inspectorate mobilise a Simtars response in response to the exercise scenario in all future Level 1 Mine Emergency Exercises. This will test the interaction and communication process between the inspectorate and Simtars.

2. The CRO position should be a competency based position which includes knowledge of monitoring systems and gases.

3. Refuge bays/changeover stations should include communications and gas supplies and monitoring lines.

4. A computerised system should be introduced for duty card operation and logging of actions. This should also be used to check validity of duty cards for use of back shifts and practicality of operations.

5. It is recommended that one of the training rooms be set up as an incident management room, and that a person, detailed in the emergency procedures, be positioned as a door guard to prevent disruptive entry to this room.

6. It is recommended that duty card sheets are made “tick and flick” style sheets, and that senior management adhere to their defined areas. This ties in with IMT as a specific team in a specific place with defined areas.

7. All personnel should be trained, including refresher training, in the location and basic content of the emergency response plan.

8. It is essential that the incident Control Room be complete with a number of electronic whiteboards, accurate mine plans, desktop space, communication facilities – preferably with automatic call forwarding of all incoming underground phone calls, video/audio recorders, secretarial/shorthand support and security against intrusion.

9. All persons, including managers and supervisors, must be trained in the use of self rescuers and their changeover procedures in genuine environments, including underground, after heavy work and in limited visibility.

10. Rescue room needs to have up-to-date and suitable rescue plans in the room at commencement of emergency.

11. There should be a mine surface controller function to liaise with operations base and organise any requirements e.g. task allocation for personnel.
12. When using the Macroview systems, computers in the Control Room to monitor the tube bundles gas monitoring system, site personnel should have approval to move monitoring locations – not having to contact a Brisbane computer consultant to modify the diagram.

13. Alarm points in the Macroview system should be reviewed as all red alarms look the same and can be misinterpreted.

14. A log should be kept of active monitoring sites in the Control Room.

15. Utilise email system to send information between IMT and the CRO.

16. Ergonomics of Control Room to be reviewed e.g. location of DAC, 3 phones and 4 computers – with three people using these at once, no one can hear clearly or operate without distraction, increasing the risks of error.

17. It is recommended that in future the scenario be created with false alarms and staged introduction to allow for more realistic response from site personnel.

18. A mine must have an established, structured and comprehensive system for managing an emergency with a trained, disciplined response team. Duty cards are not a comprehensive system; they are simply a functional aid for the overstressed cognitive processes of the human brain in the early stages of an emergency.

19. All organizations should review the ICS for application in emergency incident control. Key areas of learning are – discipline in adhering to the system, limiting the span of control (i.e. no greater than five particular resources per person), clear authority in authorizing plans and actions and managing the communication flow.

First response

1. Consideration should be given to have a ladder or some other implement available to reach the isolation valves in an emergency.

2. Consideration should be given to implementing a first response system at the mine to deal with emergencies until professional help arrives and can be deployed to assist. Industry needs to seriously address the issue of first response by way of clearly identifying what a first response team is expected to do i.e. fight the fire plus any other identified duties and what equipment they require. This will also mean that intensive fire fighting training and other associated training will be required ASAP.

Self escape

1. Provide training in the donning, wearing and changeover of SCSRs to all underground mine workers.

2. Provide training and familiarisation in the use of the changeover bay.

3. CABA training should be provided for a minimum of four persons on every crew.

4. Grasstree should ensure that it is possible to travel all evacuation routes without complication

5. All changeover bays should be checked to a schedule as part of ERZ Controller’s inspections

6. Continued focus is required on donning and changeover of SCSR which is critical in ensuring personnel are able to effect self escape.
7. Establishment of standard cross industry non-verbal communication practices, e.g. two beeps for no and three beeps for yes, in similar fashion to cap lamp signals would supply a common knowledge necessary due to the transient nature of many mine workers in Queensland.

8. Where mines have CABA deployed and available for use underground personnel should be trained in its use for evacuation purposes.

9. Industry should review first response capability and define what actions can be taken in first response. First response activities should be subject to risk assessment and competencies of the responding personnel.

10. Continued use of real SCSRs gives the persons involved an excellent experience.

11. There should be continued focus on training in the donning and changeover of SCSRs.

12. This is critical in ensuring personnel are able to effect self escape/survive in an irrespirable atmosphere.

13. Non-verbal communication – suggest to add four beeps for “Do not know/cannot answer”.

14. The photo showing the collapsed hose on the SCSR should be distributed to all mine sites and added to the training package for the unit.

15. Injured personnel could have simulated injuries to increase realism for responding QMRS personnel.

16. The layout of the changeover bays should be reviewed to ensure that congestion at the entrance is eliminated and the availability of floor space is maximised.

17. Program a schedule of works to ensure the main escape-way between Grasstree and Grasstree West is kept in a trafficable condition.

18. There should be confirmation of the standard practice for evacuees in a changeover bay. There is a risk that changeover bays are assumed to be mandatory fresh air and that it is okay to take off an SCSR once inside.

19. Increase the frequency of training in the application of SCSRs to ensure that this skill is available when required under adverse conditions.

20. When training SCSRs are to be used, assessors must be instructed in their use. The training SCSRs should also be opened and assembled immediately prior to use - not set up in advance.

21. A system for effective transport of persons from Grasstree West to Grasstree needs to be provided.

22. Continued focus is required on donning and changeover of SCSRs which is critical in ensuring personnel are able to affect self escape.

23. Mineworkers require training and need to demonstrate competency in the evacuation protocols of their mine.

24. All mine sites should implement a personal tracking and recording system or a process to identify who is where at what time. Systems are under development but industry and testing/approval processes should be improved to encourage private investment in further development and cost reductions.

25. Training in donning and use of SCSRs needs to be addressed as indicated by previous Level 1 Mine Emergency Exercises, and highlighted in recent forums in
the United States of America (USA). It is recommended to industry that a similar competency based training regime to that proposed by the USA mining industry (at refresher intervals of 3 months) is implemented as well as ensuring that all mineworkers have used a real SCSR or a training rescuer that has simulated heat and resistance capabilities.

Not only should training in the use of SCSRs be reviewed, but also the option of installing “changeover” stations, or equivalent, where escaping mineworkers can changeover the SCSR in a less hazardous atmosphere, communicate with surface and also have the option of remaining in the station for a period of time.

27. Whenever possible mine workers utilise underground transport for evacuation purposes.

28. Serious consideration should be given to providing a SCSR (or equivalent) with a face mask that would allow communication. This does not necessarily mean to every worker, but of sufficient numbers to facilitate reasonable communication.

29. SCSR training to include information on non-verbal communication and the dangers of talking through self rescuers.

30. Consideration should be given to installing a pull-down lifeline (on bungee cord) with directional cones, positioned above the wheel ruts, which formed a natural track.

31. Consideration should be given to attaching some type of chime (like a wind chime) to a lifeline or similar device, which would be activated by the movement of people as they approach the cache.

32. All mines conduct an audit of their evacuation routes to identify and rectify any defects that may be found.

33. It is recommended that cache layouts should be standardised and lifelines provided which lead directly to the cache box.

34. Consideration should be given to supplying simple hook on ropes in each emergency breathing apparatus (EBA) cache, or training in an alternative hook-on method, such as using the cap lamp cables (each person hooking on the lamp of the person behind—forming a chain).

35. Well designed changeover stations similar to some current “refuge chambers”, included in EBA cache areas, would have helped safeguard workers during the SCSR process or would facilitate refuge for those in difficulty. Such changeover stations would allow for mineworkers to rest, change SCSR in fresh air, plan their method and route of escape and, as a last resort, leave an injured person(s) who cannot travel to await rescue. Audible signs (chimes) would have assisted workers identify their location and the proximity of key emergency infrastructure.

36. Review protocols for donning and changeover of SCSRs and provide appropriate training to all personnel.

37. Review footage of self-rescuer changeovers from the exercise as a learning tool.

38. Review time frame for removal of MSA Lifesaver 60.

39. Develop a standard evacuation protocol that includes:
   
   a. Use of transport
   b. When to change self-rescuers
   c. Non-verbal communication
   d. Route of travel
40. Consideration should be given to the provision of whiteboards at muster points to assist with non-verbal communication.

41. Mine personnel should spend some more time in brainstorming/training sessions to utilise available equipment innovatively to make air showers, barricades etc. This will improve the likelihood that panic won’t set in should some personnel be unfit to facilitate self escape. It would be particularly beneficial where there is more than one person to use the airline.

42. Escapeways, and their alternatives, must be walked regularly until all personnel are familiar with them.

43. All personnel, including managers and supervisors must undertake regular genuine emergency evacuation incorporating poor visibility to best test the adequacy of the current systems and accurately determine emergency preparedness.

44. There must be an integrated approach to emergency evacuation focusing on enhancing survival covering: self rescuer changeovers to occur in safe havens; safe havens to be fitted with lighting, drinking water and mine plans of where you are and routes of travel to the next haven and explosion proof communication channels; distances between safe havens to be spaced for worst case scenarios of zero visibility; signs and arrows pointing to escapeways, oxygen caches, doors or roadways, delineated by hanging lanyards from the roof, must be visible and all escapeways must be maintained in good order free from excessive walking hazards.

45. It is recommended that the provision of audible call sirens be installed in the safe havens in the face areas to help lead people to them. This would allow a full accounting of persons and the provision of appropriate breathing apparatus and the ability to render any necessary first aid.

46. It appears almost impossible for a changeover of self rescuers to be done under duress without the protection of a safe haven.

47. Audible signals may be the best method to guide personnel back to face area safe haven.

48. Safe havens can be used as ‘hubs’ from which guidelines can extend, at a reachable height, to a number of escape ways.

49. Safe havens to contain suitable compressed air breathing apparatus that may be utilised to provide ‘search capability’ or ‘first aid’ and ‘fire fighting’.

50. Explosion proof communication systems such as buried telephone lines should be explored.

51. It is strongly recommended that the process of self rescuer changeover be closely investigated and through consultation with the manufacturer, a standard procedure for the changeover of these sets be formulated to minimise the problems associated with the donning of self rescuers.

52. The mine should re-investigate the escape timelines and distances between cache locations in longwall returns – particularly where poor visibility may be experienced.

53. Investigate the number of SCSRs in the longwall return caches. In this scenario there were sufficient numbers, but there were only six people on the face. If there had been one more person on the face, there were no spare units in the caches. The escaping crew expressed concerns during the debrief on this point. Self escape routes need to be planned and serviced by sufficient SCSRs for the maximum number of personnel in the panel in both primary and alternate routes.
54. During the refresher training for SCSRs, mines must ensure that duration times of “at work” and “at rest” are explained to wearers.

55. Communication using pens and notebooks, and not talking through mouthpieces, should be adopted as an industry standard.

56. Self rescuer training should focus on entrapped procedure i.e. walking with O₂ turned off, resulting in an extra 20 minutes of O₂ time.

57. Self rescuer manufacturers to investigate modifying units to have “fluoro” mouthpieces and breathing tubes; worn over shoulder; have harder mouthpieces; have wire reinforcing in breathing tubes to prevent their constriction when heavy breathing; be easier to open and handle with wet/slippery hands; have interchangeable mouthpieces...

58. Walkways over overcasts should have handrails to prevent falling off, and not have raised steps or trip hazard and ladders traversing overcasts should be lined up or have guidelines joining them..

59. The provision of water-proof notebooks for recording information underground should be investigated.

60. Trial the use of walking sticks in areas of excessive rib spall. The trial to consider the appropriateness of using “candy cane” shaped curve handles, or the current right angled “elbow” shaped handles.

61. Treat any person who ‘escapes’ in the hot and humid conditions as a patient to ensure they recover from the experience – particularly re-hydration of the patient..

62. It is recommended that the ergonomics of the CABA main valves be reviewed and modified (if possible). The need to turn two valves in different directions using different hands will inevitably give rise to circumstances where both cylinders are not fully operated.

63. Access and storage of CABAs could be improved to enable easier donning of the units; review the number of CABA units and accessories (buddy masks); review pre-start checks – is the one minute high pressure leak test necessary?; training on CABAs to include oxygen cylinder use philosophy – turn one on, when warning whistle sounds turn the other on (as used in search and rescue).

64. Protocol to be developed for information transfer in an emergency – should prompt any user about the important points to be communicated.

65. Link-lines between members of the group would prevent separation of members. Link-line would need to consider distance between members e.g. buddy mask line is a limiter. A life-line would facilitate escape speed and route.

66. Indication required at cut-throughs (both sides and ribs) to identify escape facilities such as telephones, DAC and caches. Suggest that only two levels of demarcation/indication be used – one for communications and one for escape apparatus.

67. Review CABA training to ensure contingency actions are known and rehearsed. This should cater always for the unexpected. Review maintenance program to ensure that CABAs are maintained in a state of operational readiness – the program should meet, as a minimum, manufacturer’s recommendations. Back-up facilities to any escape system/apparatus are required in the event of equipment failure.

68. Review emergency escape protocols to ensure the issues of how many units to carry and when to changeover are clearly outlined. It is recognised that people in a stressful situation are liable to follow their instincts.
69. Review entry barrier to Quick Fill Station – the single pogo stick hung horizontally could be split into 3 – 4 lengths to allow easier negotiation. Quick Fill Station orientation to be reviewed to enable easier and quicker access and also facilitate the use of the multiple refill points – recommend that the station be turned 90° so that the refill points are in line with the cut-through and do not face the rib. Main valve operation on refill side of the Quick Fill Station should be reviewed – is it required? Can it be arranged to turn on when any quick fill outlet is operated? Maintenance and inspection program to be reviewed to include external fittings and their operation.

70. To assist in locating phones in thick smoke, phones should give an audible beep on a regular interval.

71. When the Deputy or ERZ Controller is taken away from the crew there is no gas detection capability to determine the necessity of continuing to wear self rescuers. The provision of a fixed station’s visible display of gas readings e.g. at positions in the primary escape roadway may be worth investigating. The potential for the provision of multi-gas detectors and relevant tubes in caches and training in their use should be investigated.

72. The introduction of changeover stations to the mines should be evaluated. This would allow verbal communication with the surface en-route and provide a place to leave injured persons if required. It also allows a safer environment for the changeover of SCSRs.

73. Instructing crews to discuss escape options and to have a plan and to nominate a leader prior to starting escape.

74. Consideration should be given to developing procedures and systems that allow:
   - Competent persons to use more than one fire extinguisher prior to it being classified as a major emergency. The standard operating procedure allows no objective way of risk assessing and managing the fire. Consequently, there is a reluctance to assess a fire and take other appropriate action. There are situations where more than one fire extinguisher is required to douse a fire. That does not necessarily increase the risk profile.
   - Competent persons (other than mines rescue trained teams) to be deployed in inspecting and/or fighting fires with water hoses (e.g. ERZ Controller). In some cases it is an acceptable risk to allow persons to inspect fires. The time taken to deploy mines rescue teams allows fires to increase in intensity.

75. Personnel that have evacuated to the outbye side of a fire (subject to appropriate health and fitness checks) to inspect or participate in fighting fires under the guidance of a suitably trained person.

76. Resources to be used to fight fires to be identified prior to mobilizing fire fighting teams.

77. Personnel assigned fire fighting duties should be competent and adequately briefed of the risks and their duties. The fire watch team was not considered competent to perform their duties to standard.

78. Training for personnel working alone in the mine for the discovery of fires, incidents and their actions to minimise the affects to the underground environment.

79. A realistic fire gallery should be used to train mine personnel in fire fighting.
Communication and decision-making

1. Review maintenance of personal emergency devices (PEDs) and remove faulty PEDs from service.
2. Review CRO evacuation procedures to include a general PED message to all personnel required to evacuate.
3. Review training of statutory officials (and other personnel who may be required to lead in an emergency e.g. rescue personnel, leading hands) to include decision-making, leadership, communication and accounting for personnel.
4. There must be established a central, clearly identifiable, decision-making process, based on risk assessment principles.
5. All underground communications should be capable to being call-forwarded to the incident Control Room with automatic recording devices attached.
6. Accurate information flows must be established to minimise decisions that may result in catastrophic consequences.
7. It is important that there is provision for communications out of the Control Room as all stakeholders must be kept regularly briefed on currency and status of events.
8. The lack of a formal recording system would be seen as a major discrepancy by a Warden’s Inquiry in the process of determining true nature and cause as vital information can be lost.
9. Communication between the Control Room and IMT needs improvement regarding: access of people in and out of Control Room; phone systems installed; how information is passed on, etc.
10. There must be clear authority of exactly who is in command and how decisions will be made with a definition of the composition of the incident control team.
11. Implement a communication system to the surface from each of the main cache locations for tracking of crews escaping and one-way communications from Control for updates etc.
12. Implement a system to ensure ALL personnel underground receive notification of an emergency as quickly as possible.
13. The communications interaction between the various operation areas needs to be systematically organised such that all operational areas are provided with the necessary information and updated regularly. Consideration should be given to undertaking this electronically to minimise the disruption of phone calls.
14. Provision of at least two telephones with people assigned as scribes to take incoming calls and make outgoing calls. One telephone should be assigned for incoming calls and one telephone assigned for use by the IMT for outgoing calls only. Lines of communication need to be clearly defined so that ‘closed loop’ communications can be achieved, with automatic feedback. Lines of communication will curtail some telephone traffic to the IMT and allow improved operation.
15. IMT needs to have direct communications to all critical personnel and functions. This may include debriefing of key witnesses, briefing initial team, briefing persons/teams for a critical tasks and getting direct updates from crucial areas underground. The more important the person’s/team’s task is to a successful outcome, the more direct the communications need to be with IMT.
16. There needs to be a clearly defined decision-making and validation process in place for all decisions, particularly those of the IMT.
17. The decision-making process needs more focus and each option needs to be driven to completion before allowing digression.

18. All IMT members need to be encouraged to actively participate in the decision-making process.

19. There needs to be more urgency in decision-making when retrieving persons underground who are injured or have limited life support equipment available.

20. An automated emergency callout system should be utilised and triggered from the CROs computer, with a voice message to land lines and SMS to mobile phones.

21. Improve information flow back to the communication officer. The system needs to specifically address how communication is to flow around the site and to which particular team members or individuals.

22. Communication via the emergency button on the phones was difficult, neither the underground evacuees nor control could understand each other. An adequate means of communication needs to be implemented.

23. Consider using electronic reporting systems.

24. Incident action plans should be developed and documented with time and date on them to enable all persons to be briefed on current situation and for clear understanding of required actions by operational teams.

25. If the mines drift block lights are used as an additional means to stop personnel from entering the mine the underground light should remain green to enable personnel to exit to the surface. Normal controls will be needed when a mine re-entry or deployment of vehicles from the surface is undertaken.

**Incident management and control**

1. The functions of key personnel and duty cards of the emergency management plan should be revised in light of the outcomes of this exercise to remove anomalies, duplication and streamline operations. For example, the duties of the Planning Coordinator included participation in face-to-face debriefing of personnel, maintaining an information update service and coordinating the development and dissemination of the incident action plan. These functions were actually carried out within the ICT room, except debriefing. The duty cards need to consistent with the role outlined in the Emergency Management Plan (EMP) – Preliminary EMP.UGOP.002.

2. The number and use of forms should be revised in light of what documents were actually used and for what purpose, e.g. incident action plan was the basic document used in conjunction with personal event logs. Communications logs, etc. were generally not used.

3. The potential to use a video link between the EMT and the ICT should be explored.

4. This would remove the need for information transfer and phone calls. However the connection would have to be managed and not continuous as it is recognised that this may otherwise facilitate disruption of the ICT process and then contribute to the tendency for the EMT to be too involved in ICT activities

5. The QMRS should investigate whether or not MEMS should be modified to include a formal role for a process checker and also the streamlining of the forms used.
7. The use of audio recordings should be investigated to supplement the paper system especially at times where multiple functions are being carried out and there is no time to complete logs. Software exists to digitise this and transfer it to text (better than 90% accuracy).

8. Access to and exit from ICT should be controlled to maximise focus of ICT personnel.

9. Clocks should be provided in functional areas to assist in timing and data entry into logs.

10. The objectives identified by the ICT should be better defined and prioritised, e.g. rescue underground workers, identify nature of incident, restore mine ventilation, etc.

11. Gas monitoring information should be available electronically rather than requiring manual transcription.

12. The mine should consider larger white boards better placed in the room, a table with plans under perspex to allow for easy reference, ability to place signs to limit access to room during meetings and a single point of contact to get information into meeting.

13. Provide printers connected to simulation computers or provide access to site networked computers.

14. Care needs to be taken to ensure communications are prefaced with “this is an exercise only”.

15. The simulation system should emulate the process that the Ventilation Officer would have used to transfer gas data from one system to the other for analysis.

16. A balance of skills should be put in place in the teams in order that they can fulfil the requirements of MEMS.

17. Grasstree continues to practice and improve on its incident management processes.

18. The facilities in the planning room should be improved to include display of mine plans and other associated information.

19. The mine review the skills make up of the three teams planning, logistics and operations

20. The facilities in the operations room should be improved to include the electronic access to forms, mine plans, etc.

21. Systems should be established for conveying of information on issues relating to other groups roles when identified within a different group.

22. In the event of an emergency the Emergency Management Team should report to the Incident Controller.

23. Grasstree should modify their emergency response plan to include the call out of an SSHR in the event of an incident/emergency.

24. A mines inspector and ISHR should respond and attend all Level 1 Mine Emergency Exercises. The Mines Inspectorate and the ISHRs should have fatigue policies in place to ensure that attendance can be undertaken without compromising personal safety.

25. All mines must modify their emergency response plans to contact the Mines Inspectorate via the emergency number 07 3237 1696. This means that the Mines Inspectorate emergency response can start immediately.
26. Incident Management Process—in recent years the mining industry has started to adopt the ICS training provided by the Queensland Fire and Rescue Service or the mining version called MEMS. Mine sites need to clearly evaluate which system they are going to utilise to cope with emergency response (including the conventional systems already in place). Each mine must then ensure that their staff are trained, practiced and competent to fulfil their roles and responsibilities as identified in their own system.

27. ICS - The personnel need to be trained in the functions required for the ICS system to work. This training relates not only to the functions of an individual but also to the recognition of the roles and responsibilities of others and the appropriate interaction mechanisms.

28. The Planning Group is also required to maintain an information service. This is critical to ensure that we are dealing with accurate information and that all groups are dealing with the latest and validated information.

29. Allocate activities based on the functional grouping of the ICS.

30. Risk assessments must be documented and structured for all actions and decisions being undertaken.

31. Develop a procedure or a list of questions to maximise the most of this type of interaction, and to ensure accurate information is obtained.

32. Mine site Level 2 exercises should be carried out to test the practicality of personnel to carry out designated functions with available resources.

33. Personnel should consult duty cards to ensure functions required were carried out. Duty cards should reflect required functionality. By implication duty cards specify the roles of key personnel – if function is not listed it is not part of role – e.g. what is role of Ventilation Officer? – part specified by duty card 2, but clearly the role extends beyond this.

34. Do not carry out informal or non-documented risk assessments.

35. Structure - Follow a structure for risk assessments and discussions to ensure that conclusions are reached and digression does not occur. Personnel in the Planning Group need to follow the discipline of the meeting process to ensure effective operation of the Planning Group.

36. Review the Emergency Response Principal Hazard Management Plan (PHMP):
   a. Review of the base risk assessment to ensure it covers the mine’s current risk profile
   b. Documented standards for cache layout and design and for egress marking
   c. Initial response to a fire
   d. Early warning of fire through the correct location and alarm levels of real time monitor, and TARPs for gas monitoring alarms that provide for a graduated response
   e. Defined review periods/triggers for the PHMP and associated TARPs and Standard operating procedures (SOPs).
   f. Set KPIs suitable for management review to determine the health of the PHMP such as training compliance, audit and review compliance and audit results
   g. Determine the appropriate training, assessment and retraining scheme for senior management, CRO, mining officials and duty card holders in the PHMP and associated protocols.
h. Determine the appropriate training assessment and retraining scheme for all underground personnel in escape equipment and consider the action to be taken when persons are not in training compliance.

i. Review the duty cards. Consider the provision of a simple duty card system for the CRO to assist in the direction of initial response and the tracking of personnel underground in an emergency. The current numbered duty cards (No. 1 to 8) should be reviewed as a result of and taking into account the results of the exercise.

37. Consideration should be given to the processing of incident information and decision making online so that all parties, including SSE and QMRS have all information readily available.

38. Succession plans must be developed and implemented – people were getting tired.

39. Emergency duty card systems must be reviewed as to achieving objectives using realistic numbers of personnel.

40. There must be a central, clearly defined incident control team.

41. An adequately resourced incident Control Room from which to exert central control is absolutely essential.

42. Recording and logging of events is essential and must be maintained throughout an emergency.

43. Provision must be made for impounding and securing evidence i.e. Deputy or ERZ controller mini-gas instruments.

44. Gathering of experts to provide specialist advice – proximate cause, predictive analysis, options and choices, process control experts specifically to ensure essential process occur/flow.

45. It is essential to have an evacuation trigger point flow chart on the Control Room wall, similar to the call-out procedure flow chart.

46. There must be clearly defined goals, objectives and priorities established by the Incident Control Team including the establishment of an action plan.

47. There must be effective recording procedures, especially by the Incident Control Team of any actions taken, decisions made and reasons/evidence supporting these decisions.

48. Operational base membership should be pre-planned and have identification vests on and have pre-designated times for reconvening for updates on situation.

49. Urgent need to improve the water collecting/dividing manifold.

50. A central point is needed where all current duty card holders are identified with name, location and contact phone number and possibly have something to identify them to outsiders who come to the site.

51. When duty card holders change, this needs to be identified formally. Handover procedures for the Incident Management Team and a range of suitable personnel to fill various roles should be defined.

52. Numbers of people in Incident Management Team room needs to be reduced, maximum should be 5 or 6, not 13 as was the case at various times. Possibly only have sufficient seating for the main players.

53. Process management (decision-making process, time wasting, verification of data, information flow in and out of the incident management room, briefings done on time, checking milestone events, interaction of members) remains a vital
part of incident management and must always be at the forefront of the operations within the IMT.

54. Authorities between the Underground Management Room and the IMT need to be revisited and operational effectiveness analysed.

55. The Mine Manager should be part of the IMT.

56. Reviews and assessments of critical issues need to be done in a coordinated manner and followed through to completion.

57. IMT members should not be going in and out of the room while the IMT is meeting.

58. Fire Officer to review quantities of low expansion foam held on-site and the first response capability of people with respect to fire fighting.

59. Develop improved incident management aids for the IMT to assist the application of a disciplined system for information management, recording and decision-making. Possibly pre-designed whiteboards on the back of the day-to-day whiteboards, that is, flip them over and they are laid out ready.

60. Develop a structured ‘decision’ (authority) delegation tool for assisting the IMT to remain strategic.

61. Emergency incident management training is to be considered for mid and upper level management.

62. The creation of a position of “Emergency Officer” specifically to address and facilitate expertise in emergency management, fire fighting, chemical hazard management and emergency safety training and systems (not simply another hat but a specific position). The Health and Safety Officer is a different role from this position but they would work with each other.

63. More frequent simulated exercises in atmospheres of impaired vision should be conducted. Everyone in the industry should be exposed to this scenario.

64. Ensure that the number and balance of the IMT is correct. This is a question of fatigue and how long a team should remain constituted until relieved.

65. Ensure that key personnel can be contacted at all times. The location of the Ventilation Officer was incorrectly logged and it was only when the Underground Mine Manager was contacted that the Control Room officer became aware of the Ventilation Officer’s location.

66. The system to record the names and location of personnel below ground needs improvement as when some personnel evacuated the mine their tags were not relocated on the tag board causing confusion.

67. All personnel must remove tags or replace lamps, dependent on the system of accounting for personnel when they are safely on the surface.

68. At one point the contact numbers of persons to be notified in case of emergency for the contractors still underground was discussed and how they could be acquired. If the contractor log books had been in use at the mine, as had previously been agreed to by all underground mines, the details would have been readily available.

69. Develop a card system whereby sufficiently training personnel are available to conduct the tasks required by the duty card list.

70. The impact of unstated intrinsic objectives such as – complying with established written procedures, mitigating legal liabilities and favourable judgment of performance by peers against attaining extrinsic objectives such as – saving lives, protecting property and recovery operations as research indicates that
incident management systems have little, if any, impact on the survival rates of underground personnel in the first two hours following a major event.

71. Consideration should be made towards the ‘closeting’ of the IMT for the greater part of the exercise. This may mentally reduce the potential of individuals to develop independent and innovative solutions due to long periods of intense pressure and an increase in the likelihood of developing a ‘group think’ mentality.

72. Duty card holders need to recognise the need to remain with the IMT unless authorized to leave. This is especially true if there is an exchange of roles.

73. A systematic process for evaluating fatigue should be implemented rather than rely on the individuals to notify the Incident Controller of their status.

74. Calculators should be included in the duty card briefcases.

75. Suitable techniques should be used to capture ideas, generate alternatives and evaluate the different options to allow for systematic comparison.

76. The IMT members change-over should be conducted on a staggered basis with no more than 2 persons being shifted at a time. This will provide for much more cohesion in the team and limit the possibility of loss of information.

77. A written chronological record of milestone events be kept, updated and regularly referred to.

78. Consideration be given to allowing the display of this information (through windows) so that persons can update themselves without having to constantly interrupt the IMT discussions with questions.

79. A series of check sheets should be developed for IMT2 to act as memory prompts in the same way as a debriefing officer ensures capture of information. The prompt sheets could include such things as: options discussed and reasons for not doing and/or doing; current goals/actions with expected outcomes, responsibilities and timeframes; any alternative or secondary thrusts being investigated; any limits established….time, gas levels, temperatures; problems or difficulties experienced to date.

80. It is recommended that IMT is to directly brief anybody being dispatched from the surface (mines rescue fresh air base personnel, transport drivers, mines rescue teams, etc) or at least be present during the briefing.

81. It is recommended to allocate a person as surface coordinator to oversee all of the surface tasks, movement of personnel in and out of the mine and liaison with IMT. The control, allocation and updating of the deployment and availability of resources is a vital function of a coordinated emergency response and cannot be overlooked.

82. It is recommended that whiteboards for IMT be pre-formed and ready to be filled in with information like: goals, priorities, location of men underground, known facts, assumptions or data to be confirmed (and how to confirm), gas trending, intervention activities, contingency plans (who and what), etc.

83. The CRO cannot be the first aid attendant at the same time during an incident.
Mines rescue

1. Key personnel evacuating from underground should be debriefed for all relevant information by experienced mine site personnel. This should be passed on to QMRS teams entering the mine.

2. QMRS should streamline the approval process and paperwork for the briefing of rescue teams entering the mine.

3. QMRS should formalise their guidelines by using a risk based approach to develop a set of mine re-entry TARPs based on explosibility rather than percentage of UEL and lower explosive limit (LEL) of explosive gases.

4. Mine sites should have streamlined processes for re-entry whereby QMRS and other personnel entering the mine in response to an incident are recorded.

5. Mine sites should develop their own first response teams as mines rescue deployment take a minimum of 5 hours in the Level 1 Mine Emergency Exercises.

6. Mines rescue risk assessment process needs to be streamlined to mitigate risk but also be able to provide a prompt response to mineworkers in need.

7. Consideration should be given by QMRS to review its communication methods with operational teams – this equipment is outdated.

8. Consideration is to be given to review the minimum number of mines rescue trainees – with most people working 12-hour shifts this effectively reduces the number of trainees available to respond by half (fatigue related policies), also with people choosing to live remote from mining areas response times/availability of trainees is prolonged.

9. Site based mines rescue personnel should be trained in mines rescue protocols to provide mines rescue input into the Planning Group/IMT before mines rescue arrive on-site.

10. Review response protocols for QMRS.

11. QMRS need to consider response times to all underground mines and factors which may affect this.

12. It is recommended that further efforts are implemented to ensure that all team members are aware of the task they have been asked to perform and each person's role in the team (there appeared to be confusion on team roles when the original team captain was reassigned to mines rescue fresh air base control).

13. It is recommended that consideration be given to the use of 'ex-brigadesmen' in roles such as mines rescue fresh air base officials to allow full use of "BA current" men (this is particularly relevant when rescue volunteers are few).

14. QMRS teams are to ensure all team protocols are adhered to – even in the absence of reality, it is good practice (e.g. communications and information left with FAB official, captain/team checks on equipment, etc).

15. A formal log be kept of the location and status of all rescue equipment (this task is probably best done by surface control, although it requires input from mines rescue fresh air base officials). This becomes particularly important when two types of breathing apparatus were available for use.
16. Guidelines be developed and implemented for use of vehicles in potentially poor visibility.

17. Emergency communication protocols be reviewed. The rescue efforts were hampered by a lack of effective communications between the mines rescue fresh air base and the surface. The solution presented by the rescue controller to cut the telephone lines at 2 cut-through and install a phone was prevented by the assessment team. In the scenario, this would have cut communications to the remaining survivors underground – and in reality, it would have severed communication to the rest of the mine (some sections of which were still operating). There should have been better options.

18. An expert working party be established to develop and implement a set of guidelines on the protocols for a combined mine site and QMRS intervention effort (i.e. when is it okay to keep a panel crew on breathing apparatus? When should mines rescue teams take over? How should these two groups interact with each other? What are the potential risks?).

19. A need exists to clarify the call out process to mines rescue mutual assistance to ensure that not every trainee is called to attend the site immediately and that only those required be called initially.

20. The Mines Rescue Superintendent has a responsibility to obtain information and keep his personnel fully informed of the status of events, not just wait to be told.

21. The use of home answering machines interfered with the mines rescue call out procedure.

22. A reference system needs to be introduced to ensure that only those trainees current under medical and oxygen time are placed on active duty.

23. Mines Rescue Superintendent vehicle should have ‘hands-free’ provisions to answer calls and received updates whilst in transit to an emergency.

24. Station Superintendent should be part of operations based team to assist management on mines rescue, gas interpretation, ventilation, fire fighting, escape systems and intervention strategies.

25. Mines rescue key staff need to be identified and should have colour identification jackets on.

26. Mines rescue and team captains need to be present at witnesses debriefings or read their reports.

27. Mutual assistance standard needs to be looked at as call out response times were outside the one hour limit.

28. An expert working party be established to research the use of flameproof vehicles in atmospheres containing levels of flammable gases in excess of the current legislative requirements, and guidelines to be developed on how and when they may or may not be used in life threatening scenarios. The outcome of this research may result in changes in the wording of legislation.

29. QMRS and mines through their mines rescue agreement should ensure that competencies are developed and persons training for the key positions of fresh air base controller and substation mines rescue controller so that in the event of QMRS staff members not being available, competent persons will be available for these key roles.

30. Whilst QMRS have developed controls to attempt to minimise the effects on mines rescue personnel deployed in hot and humid conditions, these controls (administrative controls) are low on the list of hierarchy of controls. It is recommended that QMRS investigate modern control methods to minimise this
hazard. Some controls may include cooling vests, cooling of breathing tubes, etc.

31. When developing mines rescue team tasks, position, status and content of the mine’s emergency equipment which may be relevant to the task being undertaken should be marked on the plan and communicated to the mines rescue teams and fresh air base controller.

32. The exercise clearly showed that the better the escape systems (and therefore survival systems) in place at a mine, the more likely it is that mines rescue teams will be required to enter and search for survivors, some of whom may be at distances not able to be covered on foot within the time constraints placed by use of self-contained breathing apparatus. The industry as a whole needs to ensure we are ready for this.

33. It is recommended that a forum of stakeholders be urgently established to develop and implement a set of protocols covering the interactions between mine site first response teams and external aided-rescue organizations. Each of these practices provides specialist, but separate, skills and resources and it is vital that the issues involved in their interactions be identified and coordinated. There is little doubt that CABA teams will increasingly form part of emergency response capabilities in our industry and we must be prepared.

34. It is apparent that some protocols may be hindering the ability of the QMRS to achieve its goals of search and rescue, therefore, it is recommended that a review of mines rescue protocols and procedures be undertaken to determine their continued compatibility with the industry change from traditional aided rescue to the current preferred strategy of self escape. This should specifically cover the policies on team sizes, minimum equipment, stand-by team protocols, etc.

35. There needs to be a review of the number of brigadesmen that the mine can supply at any time of the day or work roster. This could also be expanded to other mines in the mutual assistance group.

36. Consideration could be given to training more of the workforce in basic fire fighting.

37. Protocols on how mines rescue trained personnel on-site are to be utilised should be developed. This can take into account the type of emergency, number available and specific duty card or other specialized needs.

38. Protocols need to be developed regarding what inseam personnel can and cannot do while they are still underground. This commences with a company protocol and leads to a mines rescue guideline on actions and barriers that are required for inseam intervention e.g. could the mine’s three rescue trained personnel coming out of the mine have gone to the fire and put it out?

39. Greater effort and focus from key mine and mines rescue personnel needs to be given to getting the first team off the surface.

40. Whiteboards should be developed for use in the rescue room which clearly show: locations and state of critical equipment; team membership and their equipment; captains type board with basic emergency information and team deployment information and critical times.

41. Risk assessment of critical and/or hazardous activities should be undertaken e.g. when Team 1 decided to fight the fire – how many men should they have had; what BA should they have had (there was CABA on the surface also); what communications should they have had; what turnout gear and first aid equipment do they have; method of fire fighting; active times, etc.
42. The Incident Controller or senior IMT member should brief mines rescue teams or at least be present to ensure that all information is being passed on and that questions can be answered by somebody familiar with the mine.

43. Testing of mines rescue equipment should be continued until all of it is completed.

44. Greater concentration on getting the first team off the surface, properly debriefed and equipped is needed as this is the hardest thing to do in reality. Once the actions and limits are set by the IMT, this must become the priority.

45. The role of the QMRS within the IMT should be clearly defined e.g. formally recognised as part of the decision-making team and/or advisory and/or implementation.

46. Clearly defined instructions to be issued to rescue teams. One way of doing so could be writing the instructions on the electronic whiteboard in the IMT room and giving the printout to rescue teams.

47. The role of preparing and issuing plans during an incident should be clearly defined. Additional plans will always be required. This may be a role for the mine surveyor.

48. It is recommended to allocate a designated coordinator to the critical area underground to oversee operations and to communicate directly to IMT – this is especially critical when there are multiple groups operating in one area.

49. It is recommended that a clear decision and instruction on what breathing apparatus is to be used by persons, that is, BG174 or CABA, when both are available.

50. It is recommended that the mines rescue briefing room have schematics indicating location (surface and underground), type, quantity, pressures of all breathing apparatus equipment that can be used. This schematic could include poor visibility walking times between caches and CABA locations.

51. It is recommended that the mines rescue room have a wall prompt indicating priority actions for QMRS personnel as they arrive and when allocated to rescue room duties.

52. Use QMRS cards rather than having to make up visitors’ cards for rescue teams.

53. Mines rescue activities should be coordinated through the operations team with a clear communication strategy between mines rescue teams and operations centre, then onto the IMT and Incident Controller.

54. Mines rescue must be fully briefed on who and where people are expected to be underground.

GAG

1. Time delay for the arrival of the fuel tanker for the GAG engine (5 hours) is unacceptable.

2. Maintenance on the GAG was poor in the following areas: fuel leaks around the afterburner injectors; requirement to clean spark plug should not be performed at deployment.

3. It is essential that enough water pressure be available to safely operate the GAG unit.

4. The circumstances regarding the GAG inertisation equipment must be addressed as a matter of priority and in accordance with the current mines...
rescue agreement in the provision of adequate docking facilities and water supply.

5. Site provisions for use of GAG and mobile laboratory to be investigated and documented to include provision of power, communications to incident control team, parking and the ability to connect the tube bundle systems and other sample locations.

**Media coverage/crisis communication**

1. To ensure effective management during a crisis a communication spokesperson should be identified.

2. No matter how comprehensive your crisis communication plan becomes, it is vital that it is reviewed and updated on a regular basis.

3. Your first media release should include, as a minimum, the who, what, where and when of the situation. Only provide facts that are from reliable sources and have been confirmed.

4. The industry should develop a communication strategy to reduce fear of the exercise by mine site personnel (to reduce avoidance by mine operations personnel).
Appendix C: Management Team/Assessors

**Tilman Rasche BE, MSc**

**Chairman - Level 1 Mine Emergency Exercise Executive Management Committee, Senior Inspector of Mines, Department of Mines and Energy**

Tilman works for the Department of Mines and Energy in Brisbane and was appointed to facilitate this year's level 1 exercise.

He has 18 years experience in the Australian mining industry, as trained mining engineer, supervisor, Mine Superintendent and Health and Safety Manager for a midsized contractor group.

His particular experience lies in developing programmes in health & safety, risk assessments, catastrophic risk management, operations and business improvement, training and quality assurance in this country as well as several overseas operations.

He also has an MSc in Safety Engineering Reliability and Risk Management from University of Aberdeen with specialised skills in advanced risk and reliability methods.

In his spare time he is working towards his PhD with the University of QLD in Safety, Risk and Reliability Engineering and also provides part-time lecturing in Risk Analysis at University of Queensland's Minerals Industry Safety & Health Centre.

**Gavin Taylor**

**Chief Inspector of Coal Mines, Department of Mines and Energy**

Gavin commenced his mining career in the southern coal field of New South Wales upon leaving high school in 1967.

He worked through various roles gaining his statutory qualifications and has worked as a Deputy, Undermanager, Mine Manager and General Manager. He also has qualifications in mines rescue and this will be his fourth level 1 exercise having taken part in the initial three exercises.

**Douglas H. K. White**

**Deputy Chief Inspector of Mines (Coal), Department of Mines and Energy**

Douglas has 29 years of underground coal mining experience in the United Kingdom and Australia.

He has managed a number of mines in the Bowen Basin, and has over 10 years of mines rescue experience. He also holds a First Class Mine Managers Certificate of Competency.
David Cliff

Associate Professor, Minerals Industry Safety and Health Centre (MISHC)
University of Queensland

David’s primary role is the undertaking of applied research and consulting in health and safety in the mining industry.

Previously David was the Safety and Health Adviser to the Queensland Mining Council, and prior to that Manager of Mining Research at the Simtars. In these capacities he has provided expert assistance in the areas of health and safety to the mining industry for over nineteen years.

He has particular expertise in emergency preparedness, gas analysis, spontaneous combustion, fires and explosions.

In recent times he has also devoted a lot of energy to fitness for duty issues particularly fatigue management. He has been a member of the organising committee for the level 1 emergency exercises in Queensland underground coal mines since their inception in 1998. He has also attended or provided assistance in over 30 incidents at mines.

Martin Watkinson

Group Mining Engineer, Vale Australia

Martin is Group Mining Engineer Vale Australia. He provides operational support and guidance to the Vale coal mines on ventilation and production-related issues including equipment automation.

Martin’s previous employment was at Simtars as the Manager of the Occupational Hygiene Environment and Chemistry Centre.

Martin has been involved in the level 1 exercises since Kestrel in 2001 and was the chair for the Level 1 Organising Committee in 2006 and 2007.

Prior to joining Simtars in 2001 he was Technical Services Manager at North Goonyella Coal Mine, Senior Mining Engineer and Ventilation Officer at Moranbah North Coal Mine and Principal Mining Engineer for International Mining Consultants for seven years, undertaking assignments in China, India, Iran, Siberia, Tanzania and Vietnam.

Marek Romanski

Site Senior Executive/Mine Manager, Cook Colliery

During 34 years in the coal and hard-rock industries Marek has gained extensive experienced in all aspects of mining methods, including freeze technology driven shafts, steep seams and outburst conditions management.
In addition he has gained experience in emergency response and in extinguishing coal mine fires throughout the world.

He is heavily involved in the development of new fire fighting technologies for underground mines and tunnel industries.

**Darren Brady**

**Manager - Occupational Hygiene, Simtars, Department of Mines and Energy**

Darren, a qualified chemist and member of the Royal Australian Chemical Institute, has been involved in mine gas analysis and interpretation for the past 17 years. During this time he has been responsible for the ongoing development and support of the Simtars gas chromatograph-based Camgas system.

He has worked with mines in Queensland, New South Wales and overseas to functionally implement the system. He has developed an extensive knowledge and experience in monitoring and interpretation of mine gases during emergency situations and he has also extensive practical experience in mine sealing operations.

He heads Simtars’ mine emergency response group, which has responded to mine explosions, fires and spontaneous combustion events. He is also involved in spontaneous combustion training, testing and research.

**Jim Finch**

**Emergency Response Superintendent, Carborough Downs Coal**

Jim started in the industry 1980. He then joined QMRS in 1983, where he gained experience as Team Captain, Competition Assessor and District Assessor. He gained his Deputy Ticket in 1987.

He then worked as a miner driver in development and Wongawilli sections, and CO2 outburst areas.

From 1980 to 1998 he worked at Bocum Mine, Collinsville No.2 Mine and No.3 Mine.

From 1998 to 2003, Jim was the Development Co-ordinator, and Mine Deputy at Collinsville.

He also worked at Newlands Southern Mine and Newlands Northern Mine as Development Superintendent between 2003 and 2006.

Jim was the Development Superintendent for Carborough Downs Coal from April 2006 to June 2008, and has since taken on the role of Emergency Response Superintendent.

**Mark Freeman**

**Operations Manager, Queensland Mines Rescue Service**

Mark started his mining career as a fitter in Collinsville in 1983. He has worked at Gordonstone and Oaky No. 1, carrying out a number of roles from operator maintainer,
and Longwall Mechanical Coordinator to Emergency Response Superintendent and Safety Superintendent.

His mines rescue career started in 1984 and has continued since. He took up his present role as Operations Manager for the QMRS in 2005.

**Chris Menzies**  
**Manager - Extraction Process, Solid Energy Spring Creek Mine, New Zealand**  
Chris has 26 years of coal mining experience and has been a mines rescue brigadesmen for 17 years.

He manages the extraction process at Solid Energy’s Spring Creek Mine on the West Coast of the South Island of New Zealand.

**Jacques le Roux**  
**Production Manager, Crinum Mine**

Jacques was born in South Africa, where he graduated as a Mining Engineer at the University of Pretoria. He achieved his 1st Class Mine Manager’s Certificate of competency and worked in operational and technical roles in several underground coal mines in South Africa, before relocating to Australia in 2003.

Jacques started his career in Australia as Undermanager at Central Colliery, where he achieved his 2nd Class Mine Managers Certificate of Competency and Ventilation Officer Certificate.

Jacques worked in technical and operational roles including; Senior Mining Engineer, Deputy Manager, Compliance Manager and Ventilation Officer at several underground coal mines in the Middlemount area. He and his family became Australian citizens in 2007 and Jacques achieved his 1st Class Mine Managers Certificate of Competency.

Jacques worked as Mine Manager Crinum Mine, before moving to his current role as Production Manager.

Jacques has been an active member of mines rescue for 15 years - 10 years in South Africa and 5 years in Australia and rescue still is a personal passion. He is registered as a professional engineer in both South Africa and Australia.

**Greg Dalliston**  
**District Union Inspector, CFMEU Mining & Energy Division QLD**

Greg has been involved in the mining industry for 34 years, and has gained experience in numerous areas. He started his career as a cadet mine manager with the Queensland Coal Association prior to working in a variety of positions within the industry, including eight years as a mine deputy.

Greg is employed as an Industry Safety and Health Representative with the CFMEU, a position that he has held for the last fourteen years.

Some of the roles pertaining to this position have included:
• Participating in tripartite industry committees to develop new safety and health legislation for the Queensland coal mining industry;
• Member of state and national training committees for the mining industry;
• Conducting safety audits and inspections at coal mines throughout Queensland;
• Investigating serious and fatal mining accidents and assisting the Mining Warden as a reviewer into mining accidents;
• Conducting debriefs after incidents and providing critical incident management services;
• Development of manager, undermanager and deputy statutory national competency standards, including risk management and emergency response;
• Role in organising the 2006 Fight or Flight Seminar from which industry best practice is being developed for mine emergency response;
• Member of the Queensland Level 1 Organising Committee since its inception in 1998; and
• Member of the Coal Mines Safety and Health Advisory Council and Inspectorate Review Committee.

Greg has been part of study tours to look at issues including emergency response, risk management, international mine disasters and associated legislative changes to USA, Canada, UK, NZ and Philippines.

Dr. Eric R. Bauer

Senior Mining Engineer, NIOSH – Pittsburgh Research Laboratory, Pittsburgh, PA, USA

Dr. Bauer is currently the Deputy Branch Chief of the Disaster Prevention and Response Branch. He is involved with the day-to-day operation of the branch as well as conducting research concerning escape and rescue.

Prior to assuming his current position, he was responsible for NIOSH's refuge alternatives in underground coal mines research efforts as mandated by the MINER Act.

Dr. Bauer has been employed by NIOSH and the former Bureau of Mines for over 28 years. He has been the Principal Investigator/ Project Leader on research efforts in the areas of ground control, remote control mining, extended cut mining, ergonomics, and hearing loss prevention.

Eric has also worked in the underground coal industry as a Mine Engineer and Section Foreman. He is a certified Mine Foreman and Professional Engineer.
Seamus Devlin

**State Operations Manager – NSW Mines Rescue**

Seamus is currently the State Operations Manager of New South Wales’ Mines Rescue. He has thirty two years coal mining experience and thirty years in mines rescue and has worked in both New South Wales and Queensland. He is an Associate Fellow of the Risk Management Institute of Australia.

David Sykes

**Mine Manager, Moranbah North (Anglo Coal), Queensland**

**QUALIFICATIONS:**

Chartered Engineer (UK)
Australian 1st Class Cert of Competency
Australian 2nd Class Cert of Competency
UK 1st Class Cert of Competency
UK 2nd and 3rd Class Cert of Competency
G3 Industry risk management

David has 24 years experience in mining. His working history follows:

**EXPERIENCE:**

2006-current: Mine Manager, Moranbah North QLD (Anglo Coal)
2005-2006: Mine Manager, Dartbrook NSW (Anglo Coal)
2004-2005: Mine Manager, Central Colliery QLD (Anglo Coal)
2002-2004: Mine Manager, Kayuga UG Mine Project NSW (Anglo Coal)
1998-2002: UMIC/ Deputy Manager/ Dev Co-ordinator, Dartbrook NSW (Shell)
1996-1998: LW Coordinator, Dartbrook NSW (Shell)
1988-1994: Shift Under Manager, Frickley Colliery N/Yorkshire Group UK
1984-1988: Deputy/Overman, Frickley Colliery N/Yorkshire Group UK

Larry Ryan

**Computer Systems Engineer, Simtars, Queensland Department of Mines and Energy**

Larry has been involved in the development of Safegas, Segas Professional, Ezgas Professional and other gas monitoring software for the coal mining fields for 9 years. During the level 1 mine emergency exercise, Larry was involved in the actual running of the software simulation on the Safegas software. Larry has developed, tested, installed and commissioned the Safegas gas monitoring software at mine sites in Queensland, NSW, New Zealand and the USA.
Aubrey Bush

Site Senior Executive – CHPP Lease, Carborough Downs, Queensland

Aubrey is currently studying to complete his Mine Managers 1st Class Certificate of Competency.

Prior to this he was the Underground Mine Manager at Carborough Downs.

Aubrey carries with him 25 years of experience in coal mining. He has performed Superintendent roles at North Goonyella and Springvale, and was a Mechanical Engineering Manager for a contract company.

Aubrey also worked for several years in project management on underground projects and gas drainage.

Sam Cook

Mine Planning Engineer

Sam commenced at Xstratas’ Newlands Northern Underground in December 2005 as a student surveyor whilst continuing his studies in mine surveying.

During his time in the survey department he had significant contact with the development section of the mine, helping him to gain a thorough understanding of the workings of the mine.

After two and a half years of working within the survey department he had the opportunity to take on a mine planning role. This role has further assisted him in understanding the operational requirements of the mine.

Carissa Crozier (Logistics Coordinator)

Senior Administration Officer, Central Region, Department of Mines and Energy

Carissa migrated from the South Island of New Zealand to Australia in 2007, having lived in Australia in previous years between 2001 and 2004. Prior to this move she had been working for a New Zealand law firm.

She commenced with the Department of Mines and Energy in June 2007, and leads the Administration team in the Rockhampton Branch together with assisting the Central Safety and Health Manager, Deputy Chief Inspector of Mines (Coal) and Mines Inspectorate in the Central Region.

She has worked on several strategic committees and open forums for the Department including the Health Improvement and Awareness Committee, Sealing Workshop Planning Committee and Industry Electrical Engineering Meetings.
## Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>AMR</td>
<td>A brand of gas detector</td>
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<tr>
<td>Approved standard</td>
<td>A standard made for safety and health under the repealed Coal Mining Safety and Health Act 1925 stating ways to achieve an acceptable level of risk to persons arising out of coal mining operations.</td>
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<tr>
<td>Armoured flexible (face) conveyor (AFC)</td>
<td>A chain conveyor that conveys coal along the longwall face and transfers it to the beam stage loader.</td>
</tr>
<tr>
<td>AusAID</td>
<td>Australian Government’s overseas aid program</td>
</tr>
<tr>
<td>Beam stage loader (BSL)</td>
<td>A chain conveyor which transfers coal from the armoured flexible (face) conveyor to the gate conveyor.</td>
</tr>
<tr>
<td>Bleeder heading</td>
<td>An underground roadway in a mine where air is allowed to circulate around a working longwall face.</td>
</tr>
<tr>
<td>Blind man stick</td>
<td>Plastic conduit bent into a hook and used to guide persons who have no or limited visibility in the same way that a blind person uses a white cane.</td>
</tr>
<tr>
<td>Brattice</td>
<td>Plastic sheet material made from fire resistant antistatic material used to construct temporary ventilation control devices in an underground coal mine.</td>
</tr>
<tr>
<td>Brigadesman</td>
<td>Mines rescue team member</td>
</tr>
<tr>
<td>c/t or CT</td>
<td>Cut-through</td>
</tr>
<tr>
<td>CABA</td>
<td>Compressed air breathing apparatus</td>
</tr>
<tr>
<td>CD</td>
<td>Compact disk</td>
</tr>
<tr>
<td>CFMEU</td>
<td>Construction, Forestry, Mining and Energy Union</td>
</tr>
<tr>
<td>CH₄</td>
<td>Methane</td>
</tr>
<tr>
<td>Changeover bay</td>
<td>A place for the changeover of one self contained self rescuer to another, possibly with ventilation to ensure that this can be achieved with no exposure to contaminated air.</td>
</tr>
<tr>
<td>Term</td>
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<tr>
<td>CO</td>
<td>Carbon monoxide</td>
</tr>
<tr>
<td>CO₂</td>
<td>Carbon dioxide</td>
</tr>
<tr>
<td>Continuous miner</td>
<td>Coal cutting machine used to develop new roadways in a mine.</td>
</tr>
<tr>
<td>Crib room</td>
<td>Location where mineworkers eat, and a meeting station for the ERZ Controllers.</td>
</tr>
<tr>
<td>CRO</td>
<td>Control room operator</td>
</tr>
<tr>
<td>Cut-through</td>
<td>A passage cut through the coal, connecting two parallel entries.</td>
</tr>
<tr>
<td>Cylume stick</td>
<td>Plastic sleeved stick containing two chemicals which, when combined by twisting the stick, produce light as a result of the chemical reaction.</td>
</tr>
<tr>
<td>DAC</td>
<td>Underground intercom system also referred to as the tannoy</td>
</tr>
<tr>
<td>Deputy</td>
<td>Mine worker responsible for safety inspections. This is the name given under old Queensland legislation. See also ERZ Controller.</td>
</tr>
<tr>
<td>EBA</td>
<td>Emergency breathing apparatus</td>
</tr>
<tr>
<td>Eimco</td>
<td>Brand name of a flameproof mechanical shovel</td>
</tr>
<tr>
<td>EMP</td>
<td>Emergency management plan (interchangeable with ERP)</td>
</tr>
<tr>
<td>EMT</td>
<td>Emergency management team</td>
</tr>
<tr>
<td>E/IM IAP</td>
<td>Emergency/Incident Management Incident Action plan</td>
</tr>
<tr>
<td>ERP</td>
<td>Emergency response plan (interchangeable with EMP)</td>
</tr>
<tr>
<td>ERZ</td>
<td>Explosion risk zone</td>
</tr>
<tr>
<td>ERZ Controller</td>
<td>Mine worker responsible for safety inspections traditionally referred to as a Deputy.</td>
</tr>
<tr>
<td>Face</td>
<td>The exposed surface of a coal deposit in the working place where mining is proceeding.</td>
</tr>
<tr>
<td>Face-road</td>
<td>Underground roadway on which the longwall equipment is installed. Usually wider than the normal roadways driven.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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<tr>
<td>Flameproof</td>
<td>An explosion protection method. In relation to underground coal mine vehicles flameproof means the vehicle and engine have been modified and fitted with extra safety equipment to ensure it will not propagate or generate flame or sparks which could initiate an explosion of the surrounding atmosphere.</td>
</tr>
<tr>
<td>Flaps</td>
<td>Brattice sheets hung from the mine roof used as a ventilation control device.</td>
</tr>
<tr>
<td>Fresh air base</td>
<td>A continuously monitored station for dispatch or return of rescue teams in close proximity to irrespirable zones.</td>
</tr>
<tr>
<td>GAG</td>
<td>A device based on a Polish military jet engine used to produce large quantities of inert exhaust gas for extinguishing underground mine fires</td>
</tr>
<tr>
<td>Gas chromatograph</td>
<td>A laboratory instrument used to analyse the composition of gas samples.</td>
</tr>
<tr>
<td>Gate conveyor</td>
<td>The gate conveyor is the belt conveyor which conveys the coal from the BSL to the outbye conveyors</td>
</tr>
<tr>
<td>GC</td>
<td>Gas chromatograph</td>
</tr>
<tr>
<td>“Go Line”</td>
<td>An assembly area on the surface where mobile plant is left after servicing and when available for use.</td>
</tr>
<tr>
<td>ICS</td>
<td>Incident control system</td>
</tr>
<tr>
<td>ICT</td>
<td>Incident control team (term is interchangeable with IMT)</td>
</tr>
<tr>
<td>IMT</td>
<td>Incident management team (term is interchangeable with ICT)</td>
</tr>
<tr>
<td>Inbye</td>
<td>Mining term for into the underground mine (away from the surface) from the point of reference</td>
</tr>
<tr>
<td>Industry safety and health representative</td>
<td>A person who is appointed under Section 109(1)5 of the Coal Mining Safety and Health Act 1999 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.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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<tr>
<td>Inertisation</td>
<td>The act of decreasing oxygen concentration in the mine atmosphere by the introduction of other gases such as nitrogen or carbon dioxide to prevent a possible explosion.</td>
</tr>
<tr>
<td>ISHR</td>
<td>Industry safety and health representative.</td>
</tr>
<tr>
<td>Key performance indicator</td>
<td>A measure of performance against a required outcome.</td>
</tr>
<tr>
<td>LEL</td>
<td>Lower explosive limit.</td>
</tr>
<tr>
<td>Level 1 mine emergency exercise</td>
<td>State level mine emergency exercise 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.</td>
</tr>
<tr>
<td>Level 2 mine emergency exercise</td>
<td>A major mine site exercise to test the mine’s emergency response system and communication with external services.</td>
</tr>
<tr>
<td>Level 3 mine emergency exercise</td>
<td>A minor mine site exercise to ensure all personnel are familiar with the mine’s emergency evacuation plan and provide practical training in emergency response including evacuation.</td>
</tr>
<tr>
<td>Longwall face</td>
<td>A method of mining flat-bedded deposits, in which the working face is advanced over a considerable width at one time.</td>
</tr>
<tr>
<td>Lower explosive limit</td>
<td>The concentration in the atmosphere of an explosive gas or vapour that must be reached before an explosion of that gas can occur. Below this concentration there is insufficient quantity of fuel to propagate a reaction.</td>
</tr>
<tr>
<td>Macroview</td>
<td>A brand of mine SCADA system.</td>
</tr>
<tr>
<td>Maingate</td>
<td>The principal or central heading along which the coal is conveyed from the longwall face.</td>
</tr>
<tr>
<td>Man transport</td>
<td>Vehicle used for transporting men into and out of the mine.</td>
</tr>
<tr>
<td>MARS</td>
<td>Manual and automatic resuscitator system.</td>
</tr>
<tr>
<td>MEMS</td>
<td>Mine emergency management system.</td>
</tr>
<tr>
<td>MG</td>
<td>Maingate.</td>
</tr>
<tr>
<td>Mines Inspector or District Inspector</td>
<td>Official employed to make examinations of and to report upon mines and surface plants for compliance with mining regulations.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>term</td>
<td>laws, rules and regulations, safety methods</td>
</tr>
<tr>
<td>Mines Inspectorate</td>
<td>The organisation who control the mines inspectors</td>
</tr>
<tr>
<td>Mines rescue fresh air base</td>
<td>Location established by mines rescue when entering the mine which is known to be fresh air, i.e. uncontaminated.</td>
</tr>
<tr>
<td>MISHC</td>
<td>Minerals Industry Safety and Health Centre</td>
</tr>
<tr>
<td>MSHA</td>
<td>Mine Safety Health Administration, USA - Department of Labour</td>
</tr>
<tr>
<td>Mole</td>
<td>Name used to refer to the mine site representative on the organising committee for the level 1 mine emergency exercise.</td>
</tr>
<tr>
<td>NMA</td>
<td>Nominated Medical Advisor</td>
</tr>
<tr>
<td>Non-verbal communication</td>
<td>Method of communicating using beeps on a telephone or DAC similar to morse code.</td>
</tr>
<tr>
<td>NSW</td>
<td>New South Wales</td>
</tr>
<tr>
<td>OCE</td>
<td>Open Cut Examiner</td>
</tr>
<tr>
<td>O₂</td>
<td>Oxygen</td>
</tr>
<tr>
<td>Outbye</td>
<td>Mining term for out of the underground mine (towards the surface) from the point of reference.</td>
</tr>
<tr>
<td>Panel</td>
<td>The working of coal seams in separate panels or districts; e.g., single unit panel. A longwall face is sometimes referred to a panel.</td>
</tr>
<tr>
<td>PED</td>
<td>Personal emergency device, a short message sent or received using a personal emergency device is also called a ‘PED’.</td>
</tr>
<tr>
<td>Personal emergency device</td>
<td>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. Due system enhancements and the ability to readily contact personnel wherever they are underground, PED is also sometimes referred to as Productivity Enhancement Device.</td>
</tr>
<tr>
<td>PHMP</td>
<td>Principal hazard management plan</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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<td>-----------------</td>
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</tr>
<tr>
<td>PJB</td>
<td>Flameproof diesel powered man-riding vehicle carrying up to 12 personnel</td>
</tr>
<tr>
<td>Portal</td>
<td>The surface entrance to an underground mine</td>
</tr>
<tr>
<td>Portal guard</td>
<td>Person on security at the surface preventing unauthorised entry into the mine in an emergency and reporting all personnel evacuating from the mine</td>
</tr>
<tr>
<td>ppm</td>
<td>parts per million</td>
</tr>
<tr>
<td>QMRS</td>
<td>Queensland Mines Rescue Service</td>
</tr>
<tr>
<td>Principal hazard</td>
<td>As defined in the Coal Mining Safety and Health Act 1999, a principal hazard is a hazard at the coal mine with the potential to cause multiple fatalities.</td>
</tr>
<tr>
<td>Principal hazard management plan</td>
<td>A plan developed to manage a principal hazard as required by Section 62 of the Coal Mining Safety and Health Act 1999.</td>
</tr>
<tr>
<td>Radio ribbon</td>
<td>The radio wire pulled out by mines rescue to use as a conduit of radio communications between the active rescue team and the fresh air base.</td>
</tr>
<tr>
<td>Recognised standard</td>
<td>A standard made for safety and health under the Coal Mining Safety and Health Act 1999 stating ways to achieve an acceptable level of risk to persons arising out of coal mining operations.</td>
</tr>
<tr>
<td>Reflective droppers</td>
<td>A plastic strip hung from the roof in the mine with a reflective strip used to highlight the location of a changeover bay.</td>
</tr>
<tr>
<td>Rib</td>
<td>The solid coal on the side of a gallery or longwall face; a pillar or barrier of coal left for support.</td>
</tr>
<tr>
<td>Rib spall</td>
<td>The action of the ribs breaking down and breaking off in flakes.</td>
</tr>
<tr>
<td>Safegas</td>
<td>Brand name of a mine gas monitoring system (developed by Simtars).</td>
</tr>
<tr>
<td>Safesim</td>
<td>Brand name of gas simulation software used to input simulated gas values into Safegas (developed by Simtars).</td>
</tr>
<tr>
<td>SCADA</td>
<td>Supervisory control and data acquisition</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>-----------------------------</td>
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</tr>
<tr>
<td>SCSR</td>
<td>Self contained self rescuer</td>
</tr>
<tr>
<td>Self contained self rescuer</td>
<td>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.</td>
</tr>
<tr>
<td>Shearer</td>
<td>Mechanical device used for cutting and loading the coal on to the AFC on the longwall face</td>
</tr>
<tr>
<td>Simtars</td>
<td>Safety in Mines Testing and Research Station</td>
</tr>
<tr>
<td>Site safety and health</td>
<td>Refer to principal hazard management plan</td>
</tr>
<tr>
<td>management plan</td>
<td></td>
</tr>
<tr>
<td>Site safety and health</td>
<td>As defined in the Coal Mining Safety and Health Act 1999, a site safety and health representative is a coal mine worker elected under Section 93 by coal mine workers at the coal mine to exercise the powers and perform the functions of a site safety and health representative mentioned in Part 7 Division 2.</td>
</tr>
<tr>
<td>representative</td>
<td></td>
</tr>
<tr>
<td>Site senior executive</td>
<td>As defined in the Coal Mining Safety and Health Act 1999, a site senior executive is the most senior officer employed by the coal mine operator for the coal mine who—(a) is located at or near the coal mine; and (b) has responsibility for the coal mine.</td>
</tr>
<tr>
<td>Smoke glasses</td>
<td>Light weight goggles sprayed with paint to wear over normal safety glasses to reduce visibility to simulate possible conditions after an explosion or fire</td>
</tr>
<tr>
<td>SOP</td>
<td>Standard operating procedure</td>
</tr>
<tr>
<td>Spall</td>
<td>Flakes of a coal that are broken off a larger solid body of coal.</td>
</tr>
<tr>
<td>SSE</td>
<td>Site senior executive</td>
</tr>
<tr>
<td>SSHR</td>
<td>Site safety and health representative</td>
</tr>
<tr>
<td>Standard operating procedure</td>
<td>As defined in the Coal Mining Safety and Health Act 1999 a standard operating procedure is a documented way of working, or an arrangement of facilities, at the coal mine to achieve an acceptable level of risk, developed after consultation with coal mine workers.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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<td>-------------------------------------</td>
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</tr>
<tr>
<td>Stopping</td>
<td>A ventilation control device which stops ventilation flow</td>
</tr>
<tr>
<td>Stowage</td>
<td>In longwall mining the space from which the coal has been extracted and which has been filled with waste. Sometimes containing coal and other waste material.</td>
</tr>
<tr>
<td>Supervisory control and data</td>
<td>A system that collects data from various sensors at a factory, plant, mine or in other remote locations and then sends this data to a central computer which then analyses and manages the data and uses it to control the process being monitored.</td>
</tr>
<tr>
<td>acquisition</td>
<td></td>
</tr>
<tr>
<td>Surface controller</td>
<td>Person in charge of surface operations in an emergency</td>
</tr>
<tr>
<td>Surface marshal</td>
<td>Person responsible for coordinating personnel in an emergency</td>
</tr>
<tr>
<td>Tag board</td>
<td>Peg board where underground personnel place a token to indicate their presence in a section of the mine.</td>
</tr>
<tr>
<td>Tailgate</td>
<td>A subsidiary gate road to a conveyor face as opposed to a main gate. The tailgate commonly acts as the return airway and supplies road to the face</td>
</tr>
<tr>
<td>TARP</td>
<td>Trigger action response plan</td>
</tr>
<tr>
<td>UEL</td>
<td>Upper explosive limit</td>
</tr>
<tr>
<td>Trigger action response plan</td>
<td>A documented plan which details actions to be taken when some predetermined trigger point is reached, e.g. the actions to be taken if increasing concentrations of carbon monoxide in a mine reach a predetermined limit.</td>
</tr>
<tr>
<td>Upper explosive limit</td>
<td>The concentration in the atmosphere of an explosive gas or vapour that once exceeded ensures that an explosion of the gas cannot occur. This results from the explosive gas displacing sufficient air such that there is not enough oxygen to promote a reaction.</td>
</tr>
<tr>
<td>Undermanager</td>
<td>Mineworker who is in charge of the mine on a shift basis, i.e. shift supervisor.</td>
</tr>
<tr>
<td>USA</td>
<td>United States of America</td>
</tr>
<tr>
<td>Winder</td>
<td>An electrically driven engine for hoisting a cage or cages up a vertical mine shaft.</td>
</tr>
</tbody>
</table>
References


