QUEENSLAND MINES RESCUE SERVICE

GUIDELINES

Qld Mines Rescue Service Ltd

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INTRODUCTION

INTENT	***The Queensland Mines Rescue Services as an accredited organisation under the Queensland Coal Mining Safety and Health ACT 1999 commends and endorses these "guidelines" to provide guidance to mines rescue operators and Incident Control Teams (ICT) in the execution of the duties to achieve the objectives as is the intent of Mines Rescue activities inclusive of mine emergencies.*** ***Mines Rescue guidelines are achieved with the underpinning risk management philosophy in all that is done to minimise and mitigate the challenges, hazards and threats to personnel. However the nature of the underground coal mine environment and situations in which mines rescue teams are called to operate, these guidelines only serve to give direction and guide the decision making process. Decisions are made within risk management practices and therefore are taken by the team leader and team to achieve objectives within the framework of risk based logic. These guidelines serve as a guide to that process. The ICT of the emergency Incident has overall authority and responsibility for the emergency.*** ***The re-entry, recovery of equipment, exploration or recovery of deceased persons may be regarded as an extension of the incident for which Mines Rescue Operations commenced.*** ***It is intended that training and planned non-emergency operations be conducted with these guidelines underpinning the operation.***

Where a mines site Safety Management System (SMS), or part of, becomes ineffective, and the mine or part of the mine becomes dangerous, Mines Rescue may be requested to provide assistance with;

- providing aided rescue to endangered coal mine worker/s or;
- provide assistance to bring an abnormal or dangerous event (hazard) under control or eliminate the hazard e.g. fire, irrespirable or flammable atmosphere.
- conduct inspection/ reconnaissance for the purpose of validating the issue at hand.

QUEENSLAND MINES RESCUE GUIDELINES (OPERATIONS)

The following QMRS guidelines have been developed to provide guidance to the ICT in an emergency situation and to provide QMRS Staff and Team Members with direction with regard to their responsibilities and conduct during mines rescue operations.

All mines rescue operations both emergency and non-emergency (pre-planned) must be conducted using these guidelines and a risk management approach.

In line with the recommendations of the Warden's inquiry into the Moura No. 2 disaster, body recovery operations may be regarded as an extension of the initial emergency event.

SCOPE

The scope of the Guideline is to provide a framework of procedures and processes to assist Mines Rescue Teams manage and control hazards when conducting team operations at an underground coal mine.

This Guideline assists in the evaluation of proposed objectives and tasks for mines rescue teams to determine if rescuers can be safely deployed and operate in a mine or part of a mine that has become dangerous.

This Guideline applies to;

- All Mines Rescue emergency response operations and all coal mine operators who are party to a Mines Rescue Agreement (Queensland).
- All Mines Rescue employees, volunteer Mines Rescue Members and Coal Mine Workers of Coal Mine Operators who are party to a Mines Rescue Agreement (Queensland).
- The Accredited Corporation accredited by the Minister under the Queensland Coal Mines Safety and Health Act 1999.

1.0 MAJOR HAZARDS CONTROL PROCEDURES

1.1 Explosibility

Prior to rescuers entering or re-entering a mine, part of a mine or remaining in a mine, it is critical that the risk of potentially explosive atmospheres are assessed within the mine.

Analysis

Any analysis system of a potentially explosive atmosphere must consider all flammable gases present in the atmosphere and determine;

- the flammable gas content expressed as a percentage of the Lower Explosive Limit (LEL) present.
- the oxygen content expressed as a percentage of the Oxygen Nose Point (ONP) present.

All samples, from the same location, for both % of LEL and % of ONP must be plotted and trended together against time on the same graph.

The same graph should have the capability to plot barometric trends against time.

The data should be referenced to the Mines Rescue Explosibility Matrix and Trigger Action Response Plan (TARP).

The following points should also be considered when analysing results;

- trends in values are more important than the absolute values.
- a rapid change in a gas concentration or indicator may indicate a potentially serious situation long before the trigger level is breached.
- samples should be checked for reliability/consistency and when in any doubt, the area in question should be re-sampled.
- it must be recognised that sampling data is point analysis and may not be totally representative of the entire area.
- analysis based on hand held gas-monitoring instruments, particularly stain tubes, should be treated with extreme caution and substantiated wherever possible by more accurate methods.
- these devices are best used to confirm or deny measurements by other devices where there is some uncertainty or ambiguity in the original measurement.
- determination of explosibility should include an appropriate margin for error and uncertainty in the measurement.

When determining the explosibility risk the level following controls must be observed;

EXPLOSIBILITY MATRIX				
% of Oxygen Nose Point	> 60%	**Level 1**	**Level 2**	**Level 3**
	0 - 60%		**Level 1**	**Level 1**
		0 - 60%	60 - 80%	> 80%
		Flammable Gas % LEL		

EXPLOSIBILITY TARP						
TARP LEVEL	**Level 1**		**Level 2**		**Level 3**	
	Ignition Source eliminated or Unlikely to be present	***Ignition Source known or likely to be present***	***Ignition Source eliminated or Unlikely to be present***	***Ignition Source known or likely to be present***	***Ignition Source eliminated or Unlikely to be present***	***Ignition Source known or likely to be present***
Area of Highest Risk	Rescuer may enter environment		Rescuer may enter environment	Rescuer must not enter the environment	Rescuer must not enter the environment	No Entry into the Mine
Other	Rescuers may operate adjacent to the environment		Rescuers may operate adjacent to the environment		Rescuers may operate adjacent to the environment	

GENERAL CONTROLS	
1	Atmospheric Conditions must be continuously monitored by Rescuers underground and monitored and Trended on the surface by a competent person at all times while people are underground.
2	Prior to entry the assessment of relevant knowledge for mine re-entry must be completed and all information deemed to be adequate to determine explosibility risk level.
3	When it cannot be confirmed there are no potential ignition sources which may come into contact with a potentially explosive or explosive environment, it must be taken that an ignition source exists.
4	The level of assessment must be based on the highest level of risk within the mine not just the area which the rescue team is going to enter.
5	These control limits may only be modified when a full re-entry RA is undertaken for the specific emergency situation. The original risk assessment must be reviewed as part of this process.
6	Currency of the data must be taken into account when assessing gas results e.g. tube bundle lag times, time bag samples were taken.
7	Sufficient time must be allowed for rescuers to exit the mine or atmosphere before the environment enters unacceptable levels of risk.

Nature of Gases

When evaluating the explosibility (or toxicity) of an atmosphere an assessment must be made of the nature, type and source of all potentially flammable (or toxic) gases including:

- gas make under non-mining conditions
- known or potential blowers
- methane drainage systems
- active or sealed goaf areas
- fire gases and other gases driven off when coal is heated
- barometric variations
- ventilation changes
- gas trending

1.2 Heat and Humidity

Certain precautions should be observed when persons are required to work or train in hot and humid atmospheres. These include the utilisation of well rested people, a preference for light clothing, the regular determination of temperature and humidity. Deployment times for trained rescue Team Members based on the wet bulb temperature and the difference between wet and dry bulb temperatures are given below.

After any period of duty in a hot and humid atmosphere approximating the permissible deployment times, rescue Team Members should be normally rested for 24 hours before they are again called on to perform another such period of duty.

Further controls for mines rescue team member's exposure to heat and humidity can be found in the applicable team operations guidelines.

DEPLOYMENT TIME FOR TEAM MEMBERS WEARING BA																			
WB °C	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
Time	95	85	75	65	55	50	45	40	35	30	30	25	25	20	20	15	15	15	15

Ventilation should be considered when deploying teams, when minimal ventilation is encountered.

1.3 Toxicity and Oxygen Deficiency

- CO and CO_2 and H_2S are the main mine gases considered toxic although other gases such as sulphur dioxide, hydrogen chlorides, cyanides and halogens may be produced in mine fire environments.
- an assessment should be conducted to determine other likely fire products based on the equipment, materials and consumable present in the fire zone, and the permissible limits of these gases.
- trained rescue personnel wearing breathing apparatus are protected from the toxic effects of CO, CO_2 and H_2S. Consequently there are no entry or exclusion limits for trained, currently accredited teams wearing breathing apparatus in a toxic atmosphere.
- **breathing apparatus will be worn in all circumstances when the atmosphere contains greater than 30ppm CO, or 1.25% CO_2, or 10 ppm H_2S or 2ppm SO_2 or 3ppm NO_2 or less than 19% O_2, OR if other toxic fire products are likely to be present, as defined by legislation CMSH&R 2001 & Schedule 6.**
- due to the insulating effects of CO_2 and its reaction with external body fluids to cause skin irritations, high concentrations of CO_2 may cause discomfort to rescue teams. High concentrations of H_2S may similarly cause eye and skin irritations and appropriate protection must be considered.
- there are no entry limits for trained and currently accredited Team Members wearing breathing apparatus in an oxygen deficient environment.
- rescue operations conducted without breathing apparatus will be in fresh air conditions as defined under the Applicable Coal Mining Safety and Health Regulation:

O_2	CO_2	CO	H2S	SO_2	CH_4	NO_2
≥19% (QLD)	<1.25%	≤30 ppm	≤10 ppm	≤2 ppm	<2.5% (QLD)	≤3 ppm

1.4 Nature and Intensity of Incident

Notes:

1.4.1. The intensity of the pressure wave is halved:

- every 300 metres down a single straight roadway, or
- each time the pressure wave encounters a T-intersection.

The presence of plant and equipment in these roadways will impact on these dissipation effects (as above).

1.4.2. After the fuel is consumed, the pressure wave will continue to proceed in a direct line and will not enter dead ends and cut-through's. People situated in adjacent headings, dead-end and behind existing falls may not be affected by the shock wave.

1.4.3. After the initial ignition and expansion of the atmosphere, the area cools rapidly causing a reflected wave of lower intensity to move back into the area. Up to ten oscillations of air movement can occur in a single entry roadway or dead-ends before equilibrium is restored. This can result in lighter objects originally located outbye being drawn in towards the point of ignition.

1.4.4. Afterdamp will remain in the area traversed by the fireball or flame and can contaminate the main ventilation circuit.

1.4.5. Afterdamp from rich methane/air mixtures contains high concentrations of CO and H_2.

CH_4% In Air	Max Pressure Wave (kpa)*	Residual CO%	Residual H_2%
8	350	0.02	0.02
9	700	0.5	0.3
10	240	8.0	8.5

As measured in an experimental gallery

1.4.6. In a methane explosion pressure waves greater than 100kpa (15 psi) are unusual in practice, and extremely unlikely at or above 140 kpa (20 psi) in coalmines.

1.4.7. Coal dust in suspension can lower the ignition temperature of methane from 650 ^{o}C to 450^{o}C and the LEL from 5.0% to zero. If raised into suspension by a pressure wave, it can propagate an explosion throughout the mine with greater destructive force than with a methane/air ignition.

Unlike methane, coal dust behind falls and in dead-ends may not participate in the propagation of an explosion and people in these locations may not be directly affected.

1.5 Smoke and Fire in Any Event

In any spontaneous combustion or open fire event, any changes to the existing ventilation arrangements must be authorised by the ICT. If smoke is hazy, light coloured and not backing up against the incoming air, the fire is localised and well ventilated. Provided that flammable gases are not in danger of being ignited then fire-fighting procedures can be applied.

If smoke is dark and dense, a fuel rich fire is evident and the introduction of additional air, or disruption to the ventilation circuit may lead to a rapid change in conditions, a rapid escalation or even an explosion. If smoke back up is observed, or ventilation control of the fire zone is not possible, then immediate evacuation of all persons underground should be initiated, if it had not already been initiated. Consideration should also be given to the ignition of fire gases when diluted with other ventilation circuits. Synthetic materials also produce dark smoke on combustion.

Oxygen deficiency in air (for example less than 19% O_2 in atmospheric air) or the mine atmosphere affects the flammability of a gas and the gas mixtures and therefore the rapid combustion of an explosion.

The extent of natural or induced ventilation effects and the impact of seam geometry/dip also need to be considered to understand the dynamics of the mine atmosphere.

1.6 Gas Sampling and Analysis

Where manual samples are to be collected the container should be thoroughly purged with the atmosphere to be sampled to remove any potential contaminants.

Where aluminised wine cask bags are used to sample gases in an emergency, they should only be used once and then destroyed as hydrogen may, if present in a sample, diffuse into the inner lining of the bag and then contaminate subsequent samples by diffusing back into the sample.

Where galvanised pipes are used to sample from remote, inaccessible or hostile environments acidic mine water may react with the zinc galvanising to produce hydrogen, which would contaminate samples and corrupt analysis.

Where an underground mine is situated under an open cut, residual nitrates from shot firing may form nitrous oxide N_2O which has a high cross-sensitivity to CO readings on infrared analysers.

Gas Analysis: All relevant gases, accurate, reliable (timely, valid location/s, correctly interpreted), and trended.
Resources: A mine-wide gas monitoring system is preferred with incorporation of gas chromatography and purpose trained/qualified personnel.

1.6.1. Qualifications

- gas chromatographs are the preferred method for determining the presence and concentration of gases following a mine fire, explosion or heating as all relevant gases can be identified. Consideration should therefore be given to the utilisation of gas chromatographic systems where teams may be deployed during an emergency.
- infrared gas analysers do not identify or measure hydrogen. If a gas chromatograph is not available and explosibility determinations are required, then infrared gas analysis may be adopted providing a rule of thumb ratio CO: H_2 ratio of 1:2 (coal or coal dust involved in the fire or explosion) is utilised where H_2 levels cannot be otherwise determined.
- telemetric gas analysis systems incorporate catalytic methane sensors, which also respond to hydrogen and carbon monoxide. When other flammable gases (e.g. H_2 and CO) are present the methane scale can be utilised to indicate the explosibility of the mixture. High off-scale readings may indicate an explosive atmosphere.
- if low oxygen readings are indicated, (less than 12%) methane and explosibility determinations may be unreliable and inaccurate due to the incomplete combustion of the flammable gases on the catalytic sensor. Other preferred means should be used to determine the actual situation.
- utilisation of gas chromatography or infrared analysers for atmospheric analysis requires samples to be drawn from the underground environment, either manually or via tube bundling systems. In analysis, interpretation and decision making, due regard should be given to the associated time delay and the implications of trend analysis.
- where gas chromatographs are utilised high levels of methane, (>15%) may obscure low levels of carbon monoxide (<10 ppm). Consequently, specially calibrated gas chromatographs or infrared analysers may be needed to validate the carbon monoxide readings in these circumstances, some G.C may have limitations to analyse high levels of Methane.
- teams must be briefed prior to deployment, on the circumstances considered and evaluations conducted in the decision making process.
- teams must carry and utilise adequate and appropriate hand held gas detectors to enable atmospheric conditions to be closely monitored whilst undertaking operations in a hostile environment.
- multi-gas hand held detectors have catalytic methane sensors which also respond to hydrogen and carbon monoxide. When other flammable gases (e.g. H_2 and CO) are present, the methane scale can be utilised to indicate the explosibility of the mixture with a 5% CH_4 reading approximating to 100% LEL of the mixture. High off-scale readings may indicate an explosive atmosphere.
- well-maintained and calibrated multi-gas detectors are only reliable within + or - 10% of the true reading. Further, the presence of other gases influences the instruments reliability. When these instruments are being used as a barrier, due consideration of this reliability and sensitivity should be given.
- rescue teams should be excluded or withdrawn from the area if a trend indicates an increasing explosibility deteriorating situation within the reliability or sensitivity of the instrument/s being used, (failure of the sensor triggers a withdrawal of the team members).
- CO sensors fitted to multi-gas instruments can be adversely affected by high concentrations of CO and may take a number of hours to re-zero to fresh air after being exposed to high concentrations of CO.
- acidic or corrosive gases, (e.g. NO_2, SO_2, H_2S, and CO_2) may be lost in sampling by reaction with the vessel wall or dissolving in moisture. In tube bundling sampling systems, this loss can be as high as 1 ppm per metre of tube length.

2.0 MINES RESCUE TEAM DEPLOYMENT

Mines Rescue teams may be deployed to conduct a diverse range of tasks in an Underground Coal Mine where risk to a Coal Mine Worker would be considered unacceptable by the Coal Mines SMS, Coal Mine Safety and Health Legislation and due to their level of competence operating in environments which are irrespirable and potentially explosive. Operational activities in these environments could include;

- search and recover of missing person/s
- response to an inseam fire
- restoration of ventilation devices and systems
- remedial strata control activities
- planned operation asset recognisance
- environmental monitoring and sampling
- response to an inrush of gas or water
- response to outburst
- body recovery

As per the definition of aided rescue, mines rescue team will be initially deployed from the surface of an underground coal mine. Prior to mines rescue personnel being deployed underground from the surface of a coal mine an assessment of risk must be conducted to identify the likelihood of major hazards impacting on the safety of mines rescue personnel, (MRAS should be utilised). Hazards that must be considered, (but are not limited to) are:

- explosion
- secondary explosion
- strata failure
- fire
- inrush
- outburst
- inundation

The process outlined in the guideline for “Emergency Mine Entry or Re-entry” (EMER) should be applied to assist decision makers determine whether the risk to mines rescue personnel is within acceptable limits, MRAS tool should be utilised.

Where it is deemed the risk to be **acceptable** for mines rescue personnel to enter the mine, an “Authority to Enter” form must be completed. This document will form part of the mines rescue personnel Task Sheet along with any relevant information such as:

- up to date mine plans
- incident status
- relevant and current environmental readings and trends
- status of mine ventilation and mine services
- barometric pressure and trend

- known and unknown additional environmental conditions such as expected visibility and temperature, roadway conditions, water hazards, strata hazards.

The objective of an Authority to Enter form is to ensure the instruction for mines rescue personnel to enter a place of danger from a place of safety is unmistakable, deliberate and well informed.

2.1 EMERGENCY RESPONSE SYSTEM

2.1.1 Standby System

1. QMRS EMERGENCY RESPONSE is through the ALERTS on 1800QMRS20. The caller will notify QMRS staff – "Emergencies Only"

2. QMRS Rescue Stations are not manned on a 24-hour/day basis and may be unattended at any time

3. When QMRS Rescue Stations are unattended, a pre-recorded telephone answering device will advise the caller in the case of an emergency call the QMRS emergency number 1800QMRS20

4. When away from a permanent telephone location (land line), all QMRS Operational Managers carry a mobile phone equipped with a message bank facility. Satellite phones are available for areas where there is no mobile coverage

5. In an emergency, a QMRS Operational Manager or delegate will be available to respond to underground coal mines in the state's jurisdiction or (interstate with the approval of the Board).

2.1.2 Call-Out System

In the event of an emergency, the affected mine is responsible for the mobilisation of the mine employees who are QMRS Team Members.

Affected Mine's Responsibilities include:

- notifying QMRS Emergency Call-Out System
- verification of the emergency call and nature of the emergency
- initiation of the mine site team member's call-out
- initiation of the duty card system.

QMRS Responsibilities include:

- transport of personnel and equipment to the affected site
- establish communication between the Rescue Station and the affected site
- requesting assistance for additional mines rescue members from a neighbouring mine. The QMRS will advise the Mine Control Room Operator, who will advise the senior Mine official on site and initiate the call out.

2.1.3 QMRS Team Members

The Coal Mining and Safety Act 1999, Operators of underground coal mines, must enter into a Mines Rescue Agreement with an accredited provider to supply Mines Rescue Services.

Under current Queensland Legislation, Operators of coal mines entering into a Mines Rescue Agreement with an accredited provider of mines rescue services must comply with the following - “As a minimum either 5 persons, or 5% of the total workforce of the mine including contractors and surface employees, or an equivalent arrangement in writing with a neighbouring mine authorised by a Mines Inspector, must be currently accredited in wearing self-contained breathing apparatus and emergency rescue protocols to a standard recognised by an accredited Mines Rescue Corporation”.

When a team member arrives on the affected Minesite, they will display their Mines Rescue Identification card to gate security, then the team member **will** report directly to the Sub Station Coordinator or QMRS Official

Based on a call-out response rate, the available number of Team Members from a mine, combined with those available through mutual assistance, it is aimed to make available 2 teams for active first response, followed by a further 2 teams for on-going response within the minimum practical time period possible.

Team Members may also be trained, as Inertisation Operators but are not included for the purpose of calculation for the minimum number of team members.

Each QMRS Operational Manager, QMRS Training Officer, Mine Manager and Mines Rescue Coordinator has access to a monthly updated register of Mines Rescue Team Members.

2.1.4 (Primary) Response Equipment

Primary response is initiated using the rescue equipment stored at mine site substations. This equipment includes long duration oxygen breathing apparatus, team “minimum equipment” and atmospheric (gas) sampling equipment.

First response trailers containing equipment for two six man teams and FAB equipment are located at Dysart, Blackwater and Moranbah North Coal Mine.

2.1.5 (Secondary) Response Equipment

A range of secondary response equipment is also maintained at each Rescue Station including:

- compressed air breathing apparatus and air compressors
- high expansion foam generators
- vacuum pumps and sampling lines
- fire fighting wetting agent (foam)
- non-ferrous tool

2.1.6 Inertisation Equipment

This equipment currently comprises two GAG 3A Jet Engines, associated fuel, water supply and support equipment.

The equipment is stored at Thomas Street, Dysart to enable mobilisation to an affected mine.

3.0 IRRESPIRABLE ATMOSPHERE OPERATIONS

3.1 Operations within 500m

- entry into an irrespirable atmosphere to conduct mines rescue operations within 500m must comprise of at least 2 competent people
- an operational deployment form must be completed by a competent person. ***Appendix 2, 3 & 4***
- a competent person is located at and monitoring environmental conditions at a POS
- for distances <250m, a Standby Team consisting of at least 2 competent people (or equal to the operational team) will be available at the designated POS prior to the active teams departure
- for distances >250m up to 500m, a Standby Team consisting of at least 4 competent people (or equal to the operational team) will be available at the designated POS prior to the active teams departure. *(Lives at risk situation the active team may leave POS prior to the availability of a standby team at the POS provided the standby team is at the POS within half the expected duration time of the active teams SCBA)*
- if using CABA, the active team has an agreed departure and return time based on the QMRS CABA Control Chart. See (Appendix 3 and 4) and recorded by the competent person at the designated POS, *(Lives at risk situation the active team may leave POS prior to the availability of a standby team at the POS, provided the standby team is at the POS within half the expected duration time of the active teams SCBA)*
- the active team has the appropriate minimum equipment. (Captains Gauge Chart and CABA Control Charts), ***Section 5 General Procedures***
- if using CABA the active team commences return to POS on agreed Triggers based on the QMRS CABA Control Chart See (***Appendix 3 and 4***) to ensure return to the POS prior to the low warning whistle activating on the CABA
- if using long duration LDBA, the active team must return with more than 30 bar oxygen capacity
- when using LDBA, the deployment will not exceed 3 hours, if all extra conditions are met.

3.2 Operations > 500m

- entry into an irrespirable atmosphere to conduct mines rescue operations > 500m must comprise of at least 5 competent people.
- an operational deployment form must be completed by a competent person.
- two competent people are Located at a fully established FAB.
- a Standby Team consisting of at least 5 competent people is available at the FAB prior to the active team's departure from FAB.
- the active team has an agreed departure and return time and recorded by the competent person at the FAB.
- the active team has the appropriate minimum equipment. ***Section 5 General Procedures***
- when using long duration LDBA the active team must return with more than 30 bar oxygen capacity.
- when using LDBA the deployment will not exceed 3 hours, if all extra conditions are met.

3.3 Operational Additional Controls

- operational times when using LDBA can be extended to 3 hours if determined by an operation specific risk assessment and is approved by an appropriately qualified QMRS Operations Manager
- in the operational context of an aided rescue deployment, the standby team may arrive at the POS or FAB after a team is deployed. However, the standby team must be ready to deploy from the POS or FAB within half the duration of the active teams deployment time
- one standby team can act for two active teams if the active teams have different return times
- prior to departure from FAB, each team member must have a **minimum of 170bar cylinder pressure** for BG4
- prior to departure from the surface, each team member must ensure that their SCBA is functioning correctly and there is a **minimum of 180bar cylinder pressure for BG4 or 80% cylinder capacity for CABA**
- each team member will be equipped with a long duration self-contained breathing apparatus.

3.4 Poor Visibility

Mines Rescue Teams may encounter environmental conditions such as smoke or dust during an operation which can cause poor visibility for team members. Poor visibility has the potential to create disorientation and could result in the team or team members becoming separated and lost.

Poor visibility significantly reduces a team/s travelling speed, ability to search and general orientation. Current information from NIOSH indicates that if visibility falls below 13m, difficulties will be experienced by anyone who is not familiar with their immediate surroundings. If visibility falls below 4m, all - including those most familiar with the terrain will experience disorientation. The following controls should be observed when poor visibility is encountered by a team:

- each team member must carry a link line as part of minimum equipment
- where visibility is impaired, the team should not be spread out for search purposes
- where visibility is restricted, the team should consider the use of link lines
- route markers shall be laid so that they are visible from the last lay
- a guideline from POS or FAB should be considered where visibility is expected to be reduced. When a guideline is employed by an active team, the form (of guideline) must be identified and agreed by the team and FAB Controller, e.g. fire hose, line, pipe range, conveyor belt, radio line.

3.5 Team Orientation

Orientation is critical to an active mines rescue team's safety. If a rescuer or mines rescue team becomes disoriented whilst active, consequences could range from becoming overdue for their designated return time at a POS or FAB to depletion of BA capacity exposing rescuers to an irrespirable environment. Disorientation can be caused by:

- lack of familiarity with the mine or the area of the mine being searched
- an inaccurate mine plan
- poor visibility
- poor plan marking and reading
- lack of mine signage
- poor route marking
- team member searching on their own.

When a mines rescue team is active, the following controls should be observed to reduce the risk of disorientation:

- operations manager must verify mine plan status with colliery official
- current and up to date plan of area of operation to be supplied to team when travelling >500m
- all team members to be fully briefed on area of operation
- team Captain to confirm orientation of plan and mine on the surface and at the POS or FAB with officials (mine or mines rescue) and team members
- team Captain must mark plan to procedural standard

- team Captain must brief team regularly on team location and orientation
- where signage does not exist, intersections should be identified and confirmed by a team member as they pass through.

4.0 AIDED RESCUE OPERATIONAL GUIDELINES

4.1 Searching

When mines rescue teams conduct Aided Rescue Operations, a common strategy applied is methodical searching of specified areas of a mine where missing person/s are thought to be located. Tactics applied by teams during a search for missing persons include:

- spreading the team, (where team numbers permit) across multiple headings or roadways and searching simultaneously
- individual team members searching ahead of or adjacent to the team, e.g. stubs and seal sites.

When a Team is engaged in an operational search, the following procedures should be observed;

- prior to a team departing from a POS or FAB, the area to be searched must be clearly defined and agreed to by the Team Captain and FAB Controller

- where a team will travel further than 250m, the Captain should carry a Captain's folder with a current mine plan of the area of operation and long duration SCBA gauge chart
- the team will be fully briefed on the area of operation
- where practicable and appropriate, the active team will have at least one team member from the affected mine site

- team members must maintain line of sight and be able to determine each other's state of welfare. **NO TEAM MEMBER WILL SEARCH ALONE.**
- when a team is applying search tactics a team member must be able to effectively communicate verbal, visually or audibly, (e.g. cap lamp, hooters, ADSU's) with another team member.

4.2 Aiding a Patient to a Place of Safety

The primary objective for rescuers when they have located a coal mine worker are to protect the patient from the hazard and promote recovery (e.g. provide oxygen in an irrespirable atmosphere) and remove the patient to a place of safety.

Strategies to remove a patient from a POD to a POS can include:

- dragging the patient away from an immediate danger
- carrying patient in a stretcher
- transport the patient in a wheeled stretcher
- transport the patient in a fit for purpose vehicle
- walking a patient to a POS.

When applying these strategies, rescuers can be placed at an unacceptable risk through:

- injury from working beyond their physical capabilities e.g. LTA number of team members to carry patient
- depletion of oxygen/air from significantly increased consumption rates
- poor environmental conditions e.g. elevated temperatures, poor floor conditions, and poor visibility.

When aiding a patient to a POS, the following controls should be observed:

4.3 Dragging a Patient

- a patient should only be dragged if they are in the presence of an immediate life threatening hazard and their immediate removal is the only way of protecting them and the rescuer from the danger
- a patient should only be dragged the minimum distance necessary to eliminate them and the rescuer from the immediate hazard
- a minimum of 2 rescuers should be used to drag a patient the minimum distance.

Note: Consumption rates of up to 180l/m for rescuers wearing CABA have been recorded for this activity indicating extreme levels of cardiovascular intensity. The tactic of dragging a patient should only be used as a last resort.

4.4 Assisting a Patient to Walk to a POS

Where a patient has been assessed by the rescuers and deemed able to walk to a POS, the following controls should be observed to reduce the risk of the patient deteriorating or injuring themself and potentially placing the rescuers at an unacceptable level of risk:

- prior to walking to a POS, the patient should be assessed for potential illness and injury via primary and secondary survey to determine their capability to walk
- a team member must be designated to escort, manage and monitor the patient from locating to hand over at a POS
- the team should travel at the rate which is most comfortable for the patient if practicable and does not impact on teams designated return time
- when in an irrespirable atmosphere, a team member should be designated to ensure the patients BA is correctly fitted and secured
- when communicating with a patient wearing an SCSR in an irrespirable atmosphere, only closed (yes/no) questions should be asked and the use of pen and paper considered, limiting risk of side breathing and contaminants entering the breathing circuit
- rescuers must take fit for purpose BA with adequate duration for the patient to escape to a POS, (use of multiple BA could be considered).

4.5 Sustaining a Patient Until Assistance Arrives

When rescuers conduct aided rescue operations, the task of carrying or removing a patient to a POS may place the rescuers at an unacceptable level of risk. In these circumstances, rescuers may need to sustain the patient until assistance arrives to remove the patients to a POS.

Rescuers may decide to sustain a patient due to:

- assistance not arriving in acceptable time frame
- multiple patients
- environmental conditions change
- equipment failure
- lack of resources both personnel and equipment
- active team cannot communicate that they require assistance
- stand by team unable to reach active team to assist before active team needs to return to POS
- stand by team departure from FAB does not correspond with active team operational time.

Where rescuers make the decision to sustain the patient the following controls should be observed;

- if a stand by team fails to arrive within the active teams return trigger (***Appendix 3 and 4 for CABA,***) the active team will sustain the patient with all available resources and return to FAB
- record the patient's exact location on the captain's plan and/or event log and communicate to the POS or FAB at first communication opportunity
- as far as practicable, ensure the patients BA is adequately secure and operating normally
- leave all extra BA, (**not team minimum equipment**) with the patient/s
- record all available BA remaining with patients
- record any identified injuries of patient/s.

4.6 Carrying a Patient in a Stretcher

Where a patient is required to be moved from a POD to a POS, the use of a stretcher should be the primary tactic utilised. Carrying a patient in a stretcher is one of the most strenuous tasks a rescuer and team can undertake increasing the exposure of rescuers to injury and potential harm. When carrying a patient in a stretcher, the following controls should be observed:

- within 250m of a POS 3, team members should be the minimum number to carry a burdened stretcher
- >250m of POS, 4 team members should be the minimum number of rescuers to carry a burdened stretcher
- where arduous conditions exist, (e.g. a hot and humid environment, difficult travelling conditions, a large patient, etc.) the active team should utilise the standby team.

4.6.1 Stretcher Protocols

- a patient should always be transported with their head facing in an outbye direction
- when a patient will be transported down dip for an extended period, their head should be in the up dip direction
- stretchers must be lifted simultaneously by all rescuers. The rear left position on the stretcher will call “prepare to lift” and when all rescuers are set for the lift, the person will call “lift”. Lowering of the stretcher will be conducted in the same manner.
- team captains should ensure the team travels at the rate of the slowest man and to the prevailing conditions, e.g. road, visibility, heat and humidity
- when the stretcher is lowered, rescuers should rotate 2 positions clockwise to ensure their opposite arm is utilised when carrying recommences. It is also advised to check the patient’s vital signs frequently
- where there are sufficient numbers of rescuers, stretcher carriers should be regularly changed out under the instruction of the captain.

4.7 Using Mobile Transport

The following points are to be considered:

- potential environmental conditions must be assessed and determined prior to entry with a vehicle and evaluate against vehicle operating parameters
- a vehicle must not be used if CH_4 is expected to exceed 1% during operation or low O_2 concentrations
- operator must be accredited as competent in vehicle operation
- operator to be familiar with environment. Potential obstacles should be considered prior to leaving POS
- vehicle must be fully serviceable and serviced prior to entry
- vehicle not to be used outside design specifications
- vehicle for standby team
- distance travelled inbye POS must not exceed teams ability to use 2/3 of BA working capacity to walk to POS travelling at:
-
    - CABA - 2km/h @70L/m consumption = 500m
    - BG4 – 2km/h @4L/m consumption = 1500m
    - This takes into consideration the need for the team to carry an injured team member or CMW

- if a vehicle is to be used by an active team, a second standby vehicle should be available with and for the standby team within half the duration of the active team's deployment
- reduction of speed or non-use of vehicle should be considered when visibility is and/or visibility is expected to deteriorate
- obstacle information should be targeted question for debrief of escapees
- where other teams have preceded a team going active, debriefed information should be compared against on-going team information, e.g. gas values, roadway conditions, visibility etc.
-

5.0 GENERAL PROCEDURES

5.1 Minimum Equipment

When a team of rescuers operate in an irrespirable atmosphere the following minimum equipment should be carried by the team.
Extra equipment will be dependent on the task.

Minimum Equipment	Operations <500m		Operations > 500m	
	Active Team	Standby Team	Active Team	Standby Team
Communications (see 5.4 in this procedure)	**Yes**	**Yes**	**Yes**	**Yes**
SCSR (Each Team member)	**Yes**	**Yes**	**Yes**	**Yes**
Watch	**Yes**	**Yes**	**Yes**	**Yes**
Gas monitor	**Yes**	**Yes**	**Yes**	**Yes**
Stretcher >2 Team Members	Aided Rescue only	**Yes**	**Yes**	**Yes**
Recon First aid kit	Aided Rescue only	**Yes**	**Yes**	**Yes**
Route markers (required if no communications and leaving aerial)	**Yes**	**Yes**	**Yes**	**Yes**
Spare Breathing apparatus	Aided Rescue only	**Yes**	**Yes**	**Yes**
Link line	**Yes**	**Yes**	**Yes**	**Yes**
Sling Psychrometer (if operational >30min)	**Yes**	**Yes**	**Yes**	**Yes**
Captains Folder and mine plan	**Task Dependant**	**Task Dependant**	**Yes**	**Yes**

Extra Equipment	
Aided Rescue	**Environmental Monitoring**
Trauma First Aid Kit	Sample bag/s,
Spare BA	Seal Pump
Blanket	General Body Pump
	Bag Sample Tags and Tape
	Anemometer/Stick
	Measuring Tape
	Other Gas Monitor

5.2 Route Marking

The primary route marker is a standardised chemical glow stick with set standard identified in the team operations procedures and training package.

Other acceptable route markers include continuous guide line, (radio Arial, fire line, rope etc.). Chalk/marking pen may be used in conjunction with any of the above. The above can be used in a combination with each other if availability of primary method is lost.

For route marking standards and process, refer to the QMRS Training Manual.

5.3 Plan Marking

Where a plan is carried by a mines rescue team it is imperative that the plan is marked accurately and the team's location in the mine kept current on the plan.

For plan marking standards and process refer to the QMRS Training Manual.

5.4 Communications

Communications are an essential component and process in the management of risk for operational Mines Rescue Teams. Poor communication practices and standards could result in teams and team members being exposed to unacceptable levels of risk such as:

- inability to initiate assistance in a team emergency
- lack of awareness of critical information for the safety of the team or the mine.

Standard protocols are imperative for effective communication between the active team and FAB as well as within the active team.

5.4.1 Communication between Active Team and POS or FAB

Two (2) way communications should always be used between an active team and a POS or FAB where available. Acceptable forms of 2 way communications include hand held radios (wire or wireless), Mine DAC and phone systems. Where no 2 way communications are available the following procedure will apply:

- LDBA: deploy and return within 30 minutes and or establish effective/positive communication inbye.

- CABA: two way communications between an active team and POS or FAB should be verbal. The only exception (for NLAB operations) is where the competent person at a POS or FAB Controller can maintain line of site with the active team and be able to determine their state of welfare.

In order to ensure clear understanding of verbal communications between the active team and the FAB Controller, all verbal communications should be repeated and documented by the recipient and confirmed by the deliverer.

5.4.2 Communication Protocols between Active Team and POS or FAB

a) Loss of communication between active team and POS or FAB

i. if communication is required and fails, the active team should immediately attempt to re-establish communications
ii. if unable to re-establish, the team shall return to the FAB
iii. if the active team is not contactable by FAB, the FAB should utilise the standby team to locate the active team and initiate return to FAB.

b) Frequency of communication as a minimum, the active team should contact the POS or FAB when:

i. an irrespirable zone is encountered after departing the POS or FAB
ii. at each SCBA pressure check
iii. a notable change in atmospheric or environmental conditions occurs
iv. an unexpected change affects the team's ability to complete the task

v. as agreed by the FAB Controller and Team Captain.

c) Communication from the active team to the FAB should be delivered in the following format:

i. team name & location, (heading and cut-through)
ii. team condition
iii. environmental readings, (atmospheric and temperature)
iv. other information e.g. status of task, travelling from point A to point B.

5.4.3 Communication between Team Members

Clear and concise communication between team members is vital for the efficient and effective execution of a team's objective and the management of team safety. To ensure successful communications between team members the following procedures should be observed:

- the primary form of communication between team members should be verbal. In order to ensure clear understanding of verbal communications between team members, all verbal instructions should be acknowledged by the recipient and documented where practicable.
- other acceptable forms of non-verbal communications between team members both audible and non-audible are hooters and cap lamps.

Hooter code of signals - 2 = Halt, 3 = Retreat, 4 = Advance, 5 = Communicate and Continual (Emergency).

Cap lamp code of signals – Circling motion = Come forward, Side to side motion = stop, Vertical motion = Go back.

ADSU – depress the yellow button to alert other team members (emergency, team member down, locating casualty)

All non-verbal communications should be repeated by the recipient.

5.5 Entry into an Irrespirable Atmosphere - (2 minute stop)

When rescuers deploy from a POS or FAB, it is expected that they will encounter and operate in an irrespirable atmosphere. When a team of rescuers initially encounter an irrespirable atmosphere, the team leader should ensure the following protocols are observed:

- the team leader communicates the environmental conditions, (gas concentrations and temperature conditions) to all team members
- the team leader confirms with each team member their state of wellbeing and willingness to continue operations in the irrespirable environment
- the team leader confirms the current pressure of each team members BA and compares the reading to the last recorded
- ensure communications (when used) are functioning and communicate with the POS or FAB
- mark the start of the irrespirable zone on the team leaders plan (when used), also identify with a red glow stick.

5.6 Team Breathing Apparatus Checks

A major hazard to rescuers while operating in an irrespirable atmosphere is the risk of depletion of air or oxygen from their BA. One of the primary controls to manage this hazard is mandatory checking and recording of team member BA pressures prior, during and after a team's deployment from a POS.

When using BA the following pressure checks must be applied;

BA Type	Pressure Check	Record
CABA	During preoperational checks	Not Recorded
	Prior to departure from a POS or FAB	Recorded
	When an irrespirable atmosphere is encountered, (every 2 – 3 minutes individually)	Not Recorded
	Every 10 minutes after departure from a POS or FAB	Recorded
	On return to the POS or FAB	Recorded
LDBA	During preoperational checks	Not Recorded
	Prior to departure from a POS or FAB	Recorded
	When an irrespirable atmosphere is encountered, (2 minute stop)	Not Recorded
	Every 20 minutes after departure from a POS or FAB	Recorded
	On return to the POS or FAB	Recorded

5.7 Return to a POS or FAB

An active team becoming overdue for their designated return time to a POS or FAB can lead to an extreme level of unacceptable risk for the active team members. A team becoming overdue can be caused by:

1) Return rate of travel slower than advance rate due to:

- **a)** greater grade of return incline
- **b)** greater burden for the team to carry on return to FAB
- **c)** poor time management
- **d)** no assistance to carry extra burden (collapsed team member/patient) due to:
  - **i)** stand by team availability does not correspond with active team operational time
  - **ii)** stand by team not aware assistance is required and not activated
  - **iii)** stand by team not activated due to no established communications.

The following controls should be observed to aide punctual return to a POS or FAB:

- an active team must return to a POS or FAB at or prior to their designated and agreed return time and/or prior to the warning whistle on a CABA (50 bar) activating or 30bar pressure on a Long Duration closed circuit BA
- prior to departure from a POS or FAB, defined triggers for initiating return to the POS or FAB (based on time and BA pressure) must be agreed and implemented by the team captain and POS or FAB Controller. ***Appendix 3 and 4 for CABA.***

When using Long Duration closed circuit BA the following points should be considered when determining return triggers:

- for a laborious task a consumption rate of 4 L/m and a maximum return travel rate of 1.5 km/hr. should be considered
- for a non-laborious task a consumption rate of 2 L/m and a maximum return travel rate of 3 km/hr. should be considered.

Additional generic triggers which will initiate the return to a POS or FAB are:

- **a)** breathing apparatus failure
- **b)** abnormal rate of air/oxygen consumption
- **c)** loss of communication, (where required by these guidelines)
- **d)** failure in an item of minimum equipment
- **e)** an injury or adverse physical or mental condition occurs to or is observed in a team member
- **f)** an adverse condition is encountered or an adverse alteration to the environment
- **g)** the leader is instructed to return by the FAB or ICT
- **h)** the task set is beyond the capabilities of the team
- **i)** team discipline breaks down.

5.7.1 When returning to a POS or FAB an Active Team should return via the route travelled from the POS or FAB

It has been recognized that circumstances may occur during an active team's operational time which may force the team to return to a POS or FAB via an alternate route or as a last resort locate a new POS, due to:

- the original route of travel becomes un-trafficable
- another POS is utilised due to unacceptable risk to the team or a team member. e.g. Team member collapse and team exits to closest POS, (fresh air).

In order to reduce the risk to team safety, the following additional controls should be observed:

a) Prior to an active team departure from a POS or FAB, a contingency plan with alternate routes of travel back to the designated POS or FAB should be identified and agreed upon by the Team Leader and Competent person at the POS or FAB

b) Route marking should be continued by the active team to any new POS

c) Where it has been necessary for an active team to source another POS they should:

i. Prior to departure for new POS, inform FAB of location and agree on ROT and new POS

ii. If an active team is off aerial, they should as soon as practicable after reaching a new POS contact FAB, (from nearest communications) and inform of location.

5.8 Coupling up Inbye the Fresh Air Base Defining the Irrespirable Zone, (Inbye the FAB)

If response to an incident may be facilitated by proceeding beyond the POS or FAB uncoupled, then mines rescue teams may do so, providing approval is given by the ICT/QMRS official or delegate, having given consideration to the following:

- the inbye atmosphere must comply with fresh air conditions as per Coal Mining Safety and Health Regulations 2001 limits
- the inbye atmosphere is continuously monitored with a multi-gas instrument as the team proceeds
- a sudden change in the environment through outburst, roof fall, and air reversal or ventilation failure is not anticipated
- communications must be continually maintained with FAB
- upon encountering a deterioration of atmospheric conditions the team must couple up and carry out prescribed tests before proceeding.

5.9 Body Recovery

Re-entry and exploration within a mine for the recovery of bodies should be a pre-planned operation using a risk management approach.

The Guidelines for Emergency Mine Entry or Re-entry should be adopted as a framework for identifying the risks and controlling the hazards associated with the proposed operation. However, entry limits as identified in The EMER guideline will need to be reviewed with appropriate limits determined by Mine Management, Inspectorate and QMRS. Additionally, MDG 1029 guidelines for agency coordination during body recovery at NSW mines should also be referred to:

Where QMRS mines rescue team members are to be used as part of the body recovery process the following selection process should be considered:

1. Call for volunteers

a) prior to the calling of volunteers, notification of calling for volunteers should be effectively communicated to the affected SSE and Mine management groups in an official communiqué from QMRS CEO

b) volunteer of personnel.

2. Effective written communication to volunteer personnel and mine site management regarding potential operation including:

- background and purpose/objective of the recovery operation, expected time commitments, communication to families during operation, psychological support

3. Suitability and information process should occur including information on the task, potential implications, psychological evaluation by QMRS representative e.g. psychological assessment questionnaire on suitability

4. A planned and defined deployment schedule and process including briefing operational teams and on roles, debriefing and psychological support during operation

5. Return debrief

6. Potential redeployment

7. Ongoing psychological support, as required.

Where bodies are to be recovered, consideration should be given to the wearing of breathing apparatus and protective clothing to provide protection against odours and infections and reduce subsequent psychological impacts.

5.10 Fire Fighting

Refer to QMRS Training Manual.

5.10.1 High Expansion Foam

Ensure that the use of the High Expansion Foam Generator is instructed by the Ventilation Officer and/or Mine Manager in IMT.

One litre of foam concentrate generates 34m^3 of foam, therefore

$$\text{Litres to fill a roadway} = \frac{\text{section area x length}}{34}$$

2.8m^3/sec production with bypass valve fully open
0.65m^3/sec production with bypass valve fully closed

Example:

Litres of foam concentrate required to fill a 5m by 5m drift, 1km long = 735 litres

Note 1: The minimum water pressure is required to be 700kpa giving a minimum flow rate of 7 litres/sec or 420 litres/minute

Note 2: Variables to be assessed include – Intensity of fire
- Moisture on roof and ribs
- Type of high expansion foam generator
- Position of bypass valve

5.11 Environmental Monitoring.

Refer to QMRS Training Manual for Bag Sample, Vent Survey, Gas Detection, etc.

6.0 PROCEDURE FOR THE DEPLOYMENT OF RESCUE TEAMS

6.1 Establishment of a Fresh Air Base (FAB)

The Fresh Air Base (FAB), established and monitored as per standard operating procedure, represents the planned point of departure and return of active teams and is safely located in positively ventilated respirable air with gas levels within the Coal Mining Safety and Health Regulations 2001 specified limits (CH_4< 2.5%, CO< 30 ppm, CO_2 < 1.25%, O_2 > 19%).

Consideration should also be given to Coal Mining Safety and Health Regulations 2001 limits for use of electrical apparatus and diesel equipment should such apparatus and equipment be utilised at or access the FAB.

The FAB may be located on the surface or underground and requires a travel-way for men and materials, good lighting where possible, stable ribs and roof if underground, sufficient room and facilities to work efficiently.

The FAB should be manned with at least two persons one of whom is a team member and the other is competent in QMRS procedures, equipment and first aid. The QMRS Operations Manager will appoint the FAB Controller.

For a response of less than five persons or straightforward, non-laborious task one person may man the FAB.

The equipment at the FAB must be standard FAB equipment i.e. 1 x stretcher, 1 x O_2 therapy unit, gas/ventilation monitoring instruments, radio/telephone communication equipment, gas monitoring/communications log book, UTD mine plan, 1 x watch, 1 x first aid kit, BG4 O_2 cylinders equal to the number of all team members,(if BG4 are in use) drinking water, FAB relocation plan (including 50 glow sticks and or radio aerial) plus any other materials required for the task at hand.

The FAB must be equipped to enable all persons operating at or from the FAB to escape to a place of safety using SCSR/CABA. Dry clothing and blankets may also be required at the FAB.

Sufficient transport capacity must be immediately available at the FAB to enable immediate evacuation of all persons.

6.1.1 Establishment of a Place of Safety

Refer to Appendix 2

6.2 The Standby Team (Normal Operations)

The standby team is an operational rescue team that can be readily deployed to assist the active team in a contingency situation and must comprise at least the same number of persons as make up the active team.

Roles and Responsibilities

- maintain a state of operational readiness
- follow all instructions from the FAB controller which may include acting as site security whilst at FAB
- unless otherwise directed, team is to stay in their staging areas at all times with vice-captain maintaining team discipline
- team captain is to stay at the operations area listening to radio with FAB assistant and follow instructions from the FAB controller
- team captain is to take note of glow colour of team he is backing up and take close note of team's route of travel and current locations on map.

Lives at Risk Situation

The active team may leave FAB prior to the availability of a standby team at the FAB, provided the standby team is at the FAB within half the expected duration time of the active teams SCBA.

Lives Not at Risk Situation

The standby team must be available at the FAB before the active team departs the FAB. If a standby team is required to assist the active team in an emergency situation, then a further team should be immediately deployed to act as the standby team.

One standby team can act for more than one active team provided the following arrangements are in place:

- the active teams do not have the same time of return so they cannot both become overdue at the same time
- a second standby team is on the surface ready to proceed to the FAB if required.

For Example: If two 5 member teams are active and there is a 30 minute difference in return time to FAB, this situation would require two FAB officials, one 5 member team at FAB and a second 5 member team ready on the surface with a travel time of less than 30 minutes to the FAB.

6.2.1 Activation of Standby Team:

Standby team may be activated when:

- active team becomes overdue
- loss of communications with active team
- team is requested to return
- directed by the I.C.T.

If any of the above points are triggered, the standby team captain should ensure the following steps are carried out:

- couple up and slip test
- gather information from FAB Controller
- ensure team is briefed.

6.3 Return to the FAB

Refer to Section 5.7

6.4 Operational Times (Excluding Section 1.2)

Team Members should not perform more than two periods of active duty under oxygen each 24 hour cycle and at least 4 hours rest should be observed between deployments.

After any period of duty in a hot and humid atmosphere approximating the permissible deployment times team members should be normally rested for 24 hours before they are again called on to perform another such period of duty.

Team members should not be on duty, including standby at the mine site or rescue facility, for more than 12 hours in a 24-hour period.

Where applicable, consideration should be given to medical advice prior to subsequent periods of active duty within each 24-hour period.

6.5 Succession Plans

In a protracted emergency, a succession plan (roster) should be drawn up after approximately 4 hours and should include the change out of personnel in primary roles such operations managers, substation coordinators, fresh air base controller and duty officers.

Initial changeover should commence arrangements after 4 hours, effected within 8 hours and involve a brief for the successor. Irrespective of hours of duty, if effects of stress or emotion become evident, consideration should be given to relief of persons in primary role.

Gas Management TARP for F.A.B

	Level 1	Level 2	Level 3
	Trigger	Trigger	Trigger
Responsible	CH_4 – <1.0% CO – <10ppm CO_2 – <0.5% O_2 - >20% H_2S – <3ppm	CH_4 – > 1.0% < 1.25% CO – >10ppm < 30ppm CO_2 – >0.5% < 1.25% O_2 - <20% > 19% H_2S – >3ppm < 10ppm	CH_4 – 1.25% (trending towards) 2.5% CO – (trending towards) 30ppm CO_2 – (trending towards) 1.25% O_2 - (trending towards) 19% H_2S – (trending towards) 10ppm
	Action	Action	Action
FAB Controller	*Continue monitoring gas levels every 15 minutes	*Notify I.M.T. and Q.M.R.S. official and report immediately change in atmospheric readings Investigate and Validate gas readings *Notify inbye teams for information regarding atmospheric changes and to be prepared for a retreat to a (pre)determined relocation plan Duty Card 4 *Monitor gas levels constantly *Ventilation Readings to be conducted in adjacent road ways * All FAB minimum equipment to be loaded into vehicles in preparation for retreat except for radio, gas monitoring equipment and spare oxygen cylinders *Familiarise with relocation plan showing route of travel and new FAB location and appropriate reasons for the retreat for the inbye teams. Consider relocation of transporter outbye of gas zone	*Notify I.M.T. and Q.M.R.S. official *Communicate to inbye rescue teams if possible and inform to return to FAB *Retreat to a predetermined location as per Duty Card 4 following all protocols running out of aerial and/or route marking *Leave spare oxygen cylinders, relocation plan showing route of travel and letter detailing reasons for retreat.
Ops Manager (Operations)	Undertake actions as directed by planning	Ensure FAB has adequate resources to relocate. Communicate Information to IMT Consider communications to team via mines site system (i.e. PEDS) Undertake remedial action as directed from planning	Ensure FAB has established at new relocation site. Communicate Information to IMT Consider communications to team via mines site system (i.e. PEDS) Undertake remedial action as directed from planning
Ops Manager (IMT/Planning)	Collate gas information given and trend including barometric pressure	Monitor gas levels and trend Evaluate circumstances of gas migration and plan actions to rectify	Monitor gas levels and trend Evaluate circumstances of gas migration and plan actions to rectify

7.0 QMRS STRUCTURE, FUNCTIONS, RESPONSIBILITIES

7.1 Legislation & Performance Criteria

Under Section 227 (1) - of Coal Mining Safety and Health Act 1999, Queensland Mines Rescue Service Limited (QMRS) A.C.N. 080 696 791, is accredited by the Minister as a Corporation authorised to provide mines rescue services to Members of the Corporation in Queensland (Owners of Coal Mines) subject to compliance with Section 47 CMSHA 1999.

REGULATIONS REQUIRED IN RELATION TO MINES RESCUE

(ACT Section 47 Obligations of Provider of Services at Coal Mines - Call up all relevant sections of the Act and Regulations.)

EMERGENCY RESPONSE
Section 172

1) The SSE must ensure the mine has emergency response strategies for mines rescue services.
2) The strategies must provide for external assistance under:

- **a)** a mutual assistance scheme between the mine and another mine, or
- **b)** a mines rescue agreement.

3) The strategies must be capable of implementation whenever a person is below ground at the mine.

MINES RESCUE TEAM
Section 173

1) The SSE must ensure

- **a)** the underground mine has at least the required number of persons certified by an accredited corporation as competent in using self-contained breathing apparatus and emergency rescue procedures; and
- **b)** the persons are:
  - **i)** coal mine workers at the mine; or
  - **ii)** other persons whose availability to assist in mines rescue at the mine is secured by an arrangement agreed to in writing by an Inspector (of Mines).

2) In this section, “required numbers” of persons for an underground mine, means the number that is the greater of the following:-

a) 5
b) 5% of the mine’s coal mine workers.

MINES RESCUE AGREEMENT
Section 174

A mines rescue agreement for an underground mine must state the following:

- the minimum mines rescue training to be provided under the agreement
- the procedure for coal mine operators to help each other in an emergency
- how inertisation equipment controlled by the accredited corporation is to be used at the mine
- the operational procedures developed by the accredited corporation to be followed by the corporation in carrying out the mines rescue services at the mine.

INERTISATION CAPABILITY
Section 175

An accredited corporation must have:

- an operational inertisation capability, included persons trained in operating inertisation equipment, for any underground mine with which the corporation has a mines rescue agreement, and
- sufficient resources for training persons in operating the equipment.

A Mines Rescue Capability is the ability to provide an appropriate number of trained persons and maintained equipment to allow continuous rescue operations to take place and help the escape or recovery from an underground mine which has or may have an irrespirable atmosphere.

8.0 GENERAL FUNCTION OF THE QLD. MINES RESCUE SERVICE

Queensland Mines Rescue Service Ltd. is an accredited organisation comprising the staff and the QMRS Board of Directors, with the function of supporting Mines Rescue Services to the coal mining industry, as prescribed by legislation.

9.0 ROLES & RESPONSIBILITIES OF QMRS STAFF, TEAM MEMBERS & OTHERS

9.1 Emergency Operations, General

Officers of the Queensland Mines Rescue Service will use their best endeavours to provide systems, procedures, trained personnel and expertise to apply Mines Rescue Teams to emergency situations at effected mines where the site Emergency Response Capability has been exceeded and assist in the effective deployment and management of Mine Rescue Teams to an emergency at a mine.

Mines Rescue Guidelines have been developed to provide guidance for an ICT and direction for QMRS Operations Manager or authorised delegates and Team Members regarding responsibilities and conduct during mines rescue operations. QMRS Operations Manager will facilitate QMRS's role within the ICT assisting the mine in its emergency decisions.

Where, for the safety of life or property in an emergency situation, action is considered necessary that differs from these guidelines, the QMRS Operations Manager or authorised delegate may exercise discretion and depart from these standards, providing due consideration is given to all relevant risk factors, (providing a risk management process has been followed that ensures an acceptable level of risk is achieved).

For the purpose of Emergency Operations, the Minerals Industry Risk Management Guidelines; Recognised Standard 02 and the Risk Matrix or equivalent, which is in line with industry standard is accepted practice, e.g. Australian Standards 4360. The QMRS Safety and Health Management System will have the risk management tools for use.

The role of Media Liaison for the Mine Emergency will be authorised by the Incident Controller and liaison will be conducted through the Mine Media Liaison. Otherwise in all other cases the QMRS Media Liaison will be the State Manager or his delegate.

9.2 Roles and Responsibilities

9.2.1 QMRS CEO or Delegate

- will have overall responsibility to the Board to ensure that the Board's principal functions and responsibilities are achieved in an emergency, that the guidelines are observed, and that QMRS Operations Manager and Team Members conduct themselves appropriately
- will provide support, knowledge, expertise or resources, (including an Operations Manager) to the ICT
- will act in an overview/auditing/supporting role to ensure that the resources of the QMRS are effectively deployed and utilised, and to co-ordinate resources from other agencies or state in the event of a protracted or specialised emergency
- will ensure general welfare and arrange for professional Critical Incident Stress Debriefing (CISD) and counselling services for QMRS personnel where appropriate.

9.2.2 QMRS Operational Manager or Delegate

In an emergency situation, the QMRS Operations Manager or delegate (responding to the emergency) is responsible to the CEO and shall:

- ensure that rescue teams are effectively mobilised, that adequate numbers of team members are available at all times as required and that systems and facilities are established to maintain and sustain the QMRS personnel involved
- implement and foster the Mutual Assistance Scheme
- ensure that QMRS first-response equipment is mobilised to the incident site and ready for safe use
- identify and resource additional emergency and rescue equipment as appropriate to the incident
- identify and resource additional technical expertise as appropriate from within the QMRS
- to participate as a member of the ICT and provide advice on the utilisation and deployment of escape/rescue/control and exploration systems and techniques, involving the mines rescue teams
- maintain responsibility for the detail of mines rescue operations and should ensure that rescue teams are deployed in accordance with the guidelines and QMRS procedures.
- reconsider deployment of mines rescue teams where it is deemed personnel are being exposed to an unacceptable level of risk.
- retain and maintain full responsibility for the detailed operation of the Queensland Mines Rescue Service
- establish succession plans to relieve QMRS personnel in a protracted incident
- ensure briefing and debriefing of mines rescue teams prior to and after deployment in association with the ICT.

9.2.3 QMRS Primary Response Personnel

In an emergency situation, under the direction of the QMRS Operations Manager, Station Staff and Team Members will respond as per QMRS Emergency Response Manual and the Duty Card System to:

- ensure mobilisation of sufficient team members
- ensure transportation of sufficient and appropriate rescue equipment to the affected site
- ensure the preparation of the QMRS primary response breathing apparatus and team minimum equipment, which are held at the affected mine's sub-station.
- maintain communications between the QMRS control, affected mine site Control Room and the ICT.

9.2.4 QMRS Inertisation Coordinator or Delegate

Following a request from the ICT for use of inertisation equipment, the Operations Manager or Delegate **(Appendix 6)** will arrange for the deployment of equipment to the affected site and the necessary logistical support required for the expected period of operation.

9.2.5 Mines Rescue Teams

Participation by team members in active team operations is on a voluntary basis.

The conduct of team operations will be as per QMRS operating guidelines in accordance with the objectives as determined for each team deployment including:

- participate in a thorough briefing of the team objectives, routes, limiting factors and expected timing
- carry out the assigned task as per recognised QMRS operating guidelines and in a safe efficient manner
- (where possible), maintain contact with the F.A.B
- observe and report on underground conditions and environment to enable development of appropriate strategies for control of the emergency situation.

9.2.6 QMRS Team Members

In an emergency situation, team members should ensure that they:

- obey all road rules when travelling to the Rescue Station or affected mine site
- on arrival at the affected mine site, report to and receive instructions from the appointed sub-station coordinator
- advise the appointed sub-station coordinator, QMRS official or team captain if they are unfit for duty, and comply with any designated personal screening test, (policy on alcohol; medical etc.)
- carry out equipment preparation, pre-entry checks, or other duties as directed and advise of any condition not complying with prescribed checks/tests
- as a member of an active team, operate as per standard operating guidelines and in a safe and efficient manner.

9.2.7 Rescue Team Captain/Vice Captain

In an emergency, the team captain is appointed by the QMRS Operations Manager or delegate and is responsible for:

- appointment of a vice-captain responsible for assuming the team captain's role, if required during the team operation.
- to ensure that he/she is, and all team members are, currently in compliance with active operation requirements.
- ensuring themselves and the remainder of the team have been thoroughly briefed and all are confident about participation in the operation.
- direction and control of the team as per standard operating guidelines and in a safe and efficient manner for underground practice.
- ensuring a thorough team debrief and written report preparation.
- report on conditions encountered, so that strategies can be developed for subsequent rescue, control, exploration, recovery and restoration activities.

9.2.8 Support Personnel

In an emergency, qualified mines rescue team members or competent persons, authorised by the QMRS Operations Manager or delegate, may be utilised in support roles such as:

- assembling and marshalling of teams
- briefing and debriefing of teams subject to delegation by the QMRS Operations Manager
- communications and recording at the QMRS facility or mine site
- gas monitoring
- maintenance and refurbishment of equipment
- surface substation and/or FAB Controller
- transport
- welfare

9.2.9 Mines Rescue Coordinator

The Mine Manager in consultation with the QMRS will appoint the Mines Rescue Coordinator. The Mine Rescue Coordinator is the communication link between the mine and QMRS and liaises on all matters pertaining to rescue training, mine call-out procedures and competitions.

Appendix 1, 2, 3, 4, 5, 6

Appendix 1 - CABA Inseam Response Operational Guidelines

Travel rate	***Consumption rates***
Normal (unburden) 3km/hr Burdened 1.5km/hr Time to travel distance calculation $T = \frac{d}{r(m/hr)} \times 60$ T – Time to travel d – distance travelled (meters) r – rate of travel (meters/hour) $t = \frac{250}{3000} \times 60$ T = 5 mins (travel in 250 meters) T x 2 = travel out (10mins) Total Travel 15mins.	(LAB) – 70l/m Laborious (NLAB) – 40l/m NON Laborious $t = \frac{wp \times c}{r}$ t = operational time wp = Working pressure (Full -50bar) c = cylinder capacity (litres) r = rate of consumption Laborious Task $t = \frac{190 \times 9}{70}$ T = 25mins (for every extra10 bar time increases 1 min) Non Laborious Task $t = \frac{190 \times 9}{40}$ T = 43min (for every extra 10 bar time increases 2 min)

Return to FAB Guideline LAB	Return to FAB Guideline NLAB
Based on travel rate of 1.5km/hr (10mins to return from 250m) the following triggers should be applied; Full team should commence return to FAB 10 mins prior to agreed return time or at the following full cylinder pressure; 6.8l – 150bar 9l – 125bar (Allows 700l of air @ 70l/m consumption for 10mins) Alternatively: 2 minutes for every 50m to travel and/or 140 litres consumption every 50 meters.	***Non Laborious Task*** Based on travel rate of 3km/hr (10mins to return from 500m) the following triggers should be applied; Where the route of travel consists of a distinct and consistent grade and/or the team is required to carry a greater than normal burden a consumption rate of 70l/m and a return travel rate of 1.5km/hr should be applied. Full team should commence return to FAB 20 mins prior to agreed return time or at the following full cylinder Full team should commence return to FAB 10 mins prior to agreed return time or at the following full cylinder pressure; 6.8l – 150bar 9l – 125bar Alternatively: 2 minutes per 100 meters or 80 litres consumption per 100 meters ***Laborious task*** pressure; 6.8l – 150bar 9l – 200bar

CHECKLIST FOR CABA RESPONSE UP TO 500m *This checklist must be used in conjunction with CABA Control Chart for Normal Operations.*		
PREPERATION	**YES**	**NO**
Has the type of response been defined?		
Has the POS been established and defined?		
Has an alternate POS been considered and agreed by the active team and competent person at the POS?		
Extent of fresh air known i.e. >19% O^2, <30ppm CO, <2.5% CH4, <1.25% CO^2, <10ppm H^2S		
Adequate Positive ventilation is present at POS to maintain fresh air conditions?		
Are there at least 2 competent people to enter the POD?		
Is there at least 1 competent person available to monitor and manage the POS?		
If a non-Life at risk operation will a standby team be available to respond from the POS prior to the active team deploying? <250m - 2 team members (or equal to active team No.) 250m – 500m – 4 Team Members (or equal to active team No.)		
If a life at risk Emergency will the standby team be available at the POS within half the deployment time of the active team?		
MAJOR HAZARD MANAGEMENT	**YES**	**NO**
Is a FLAMABLE ATMOSPHERE expected where the active team will be operating? i.e. >4% CH4		
If visibility is likely to be reduced has a life line from the POS been considered and agreed?		
If the active team will not maintain line of site with the POS have type of route marker and communications been agreed?		
Are Strata conditions satisfactory for entry?		
DEPLOYMENT	**YES**	**NO**
Is the task within 500m of the designated POS?		
Has the area of the active team operation been defined and agreed? (ROT, distance and location)		
Has an alternate route to a POS for the active team been considered and agreed?		
Has the active team task been documented and agreed?		
Has the active teams return time been agreed?		
Has the active teams return triggers been agreed? *Based on CABA Control chart return trigger tables.*		
Does the active team have adequate minimum equipment?		
Comments:		
Name of Competent Person:		
Signature of Competent Person:		
Date/Time:		

CABA CONTROL CHART

POS Controller Name				**POS Assistant Name**							
POS Location								**Date**			
								Time			
Area of Operation:				**Task**							
CONTROLS											
CABA cylinder size (300 bar)	9 Litre	Max Distance	500 m	**CABA pressure bar**	300	290	280	270	260	250	240
Max Deployment Time	55 mins	Min CABA Pressure	240 bar	**Deploy Time**	**55**	53	51	49	47	45	43

TEAM RETURN TRIGGERS FOR CABA DEPLOYMENT up to 500m.

LABORIOUS TASK			NON LABORIOUS TASK		
Distance	**Min Time to Return**	**Min Pressure to**	**Distance**	**Min Time to Return**	**Min Pressure to**
50m	2	**65**	50m	1	**65**
100m	4	**80**	100m	2	**65**
150m	6	**95**	150m	3	**80**
200m	8	**110**	200m	4	**80**
250m	10	**125**	250m	5	**95**
300m	12	**140**	300m	6	**95**
350m	14	**155**	350m	7	**110**
400m	16	**170**	400m	8	**110**
450m	18	**185**	450m	9	**125**
500m	20	**200**	500m	10	**125**

Team Name		**Departure**	**Designated**	**Team Return**		**Actual**
				Time	**Pressure**	

Members Names	**Dep.**	**10**	**20**	**30**	**40**	**50**	**60**	**Return**
1								
2								
3								
4								

Stand-by Team Name		**Departure**	**Designated**	**Team Return**		**Actual**
				Time	**Pressure**	

Members Names	**Dep.**	**10**	**20**	**30**	**40**	**50**	**60**	**Return**
1								
2								
3								
4								

Minimum Equipment	**Active Team**	**Standby**
Communications		
SCSR (Each Team member)		
Watch		
Gas monitor		
Stretcher >2 Team Members	**If aided**	
First aid kit	**If aided**	
Route markers (required if no line of		
Spare Breathing apparatus	**If aided**	
Link line		
Sling Psycrometer		

CABA Control Check Sheet	**Yes**	**No**	**Sign**
			Time

WB °C	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Time	95	85	75	65	55	50	45	40	35	30	30	25	25	20	20

CABA CONTROL CHART

POS Controller Name	POS Assistant Name
POS Location	Date Time
Area of Operation:	Task

CONTROLS

CABA cylinder size (300 bar)	6.8 Litre	Max Distance	500m	CABA pressure bar	300	290	280	270	260	250	240
Max Deployment Time	43 mins	Min CABA Pressure	240bar	Deploy Time	**43**	41	39	37	35	33	31

TEAM RETURN TRIGGERS FOR CABA DEPLOYMENT up to 500m.

LABORIOUS TASK			NON LABORIOUS TASK		
Distance (meters)	Min Time to Return to POS	Min Pressure to Return to POS (Bar)	Distance (meters)	Min Time to Return to POS	Min Pressure to Return to POS (Bar)
50m	2	**70**	50m	1	**60**
100m	4	**90**	100m	2	**70**
150m	6	**110**	150m	3	**80**
200m	8	**130**	200m	4	**90**
250m	10	**150**	250m	5	**100**
300m	12	**170**	300m	6	**110**
350m	14	**190**	350m	7	**120**
400m	16	**210**	400m	8	**130**
450m	18	**230**	450m	9	**140**
500m	20	**250**	500m	10	**150**

Team Name	Departure Time	Designated return time	Team Return Triggers		Actual Return Time
			Time	Pressure	

Members Names	Dep. Pressure	10	20	30	40	50	60	Return Pressure
1								
2								
3								
4								

Stand-by Team Name	Departure Time	Designated return time	Team Return Triggers		Actual Return Time
			Time	Pressure	

Members Names	Dep. Pressure	10	20	30	40	50	60	Return Pressure
1								
2								
3								
4								

Minimum Equipment	Active Team	Standby Team
Communications		
SCSR (Each Team member)		
Watch		
Gas monitor		
Stretcher >2 Team Members	If aided escape	
First aid kit	If aided escape	
Route markers (required if no line of sight)		
Spare Breathing apparatus	If aided escape	
Link line		
Sling Psycrometer		

CABA Control Check Sheet Complete	Yes	No	Sign Time

WB °C	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Time	95	85	75	65	55	50	45	40	35	30	30	25	25	20	20

QUEENSLAND MINES RESCUE SERVICE

Captains Gauge Chart and Minimum Equipment Record

Long Duration Regenerative Oxgen BA (Surface Copy)

Team Name	Date
Captains Name	FAB Departure Time
Surface Departure Time	Designated FAB Return Time

Team Members Names	Time										
	BA No.	FAB	20	40	60	80	100	120	140	160	180
1											
2											
3											
4											
5											
6											
7											
8											

DEPLOYMENT TIME FOR TEAM MEMBERS WEARING BA																			
WB °C	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
Time	95	85	75	65	55	50	45	40	35	30	30	25	25	20	20	15	15	15	15

Team Minimum Equipment		Extra Equipment		Extra Equipment	
Communications		Aided Rescue		Environmental Monitoring	
Gas monitor		Trauma First Aid Kit		Sample bag/s,	
Sling psychrometer		SCSR		Seal Pump	
First aid kit		Blanket		General Body Pump	
Mars unit (cylinder pressure)				Bag Sample Tags and Tape	
Spare cylinder (pressure)				Anemometer / stick	
Route markers				Measuring Tape	
Stretcher				Other Gas Monitor	

Notes:

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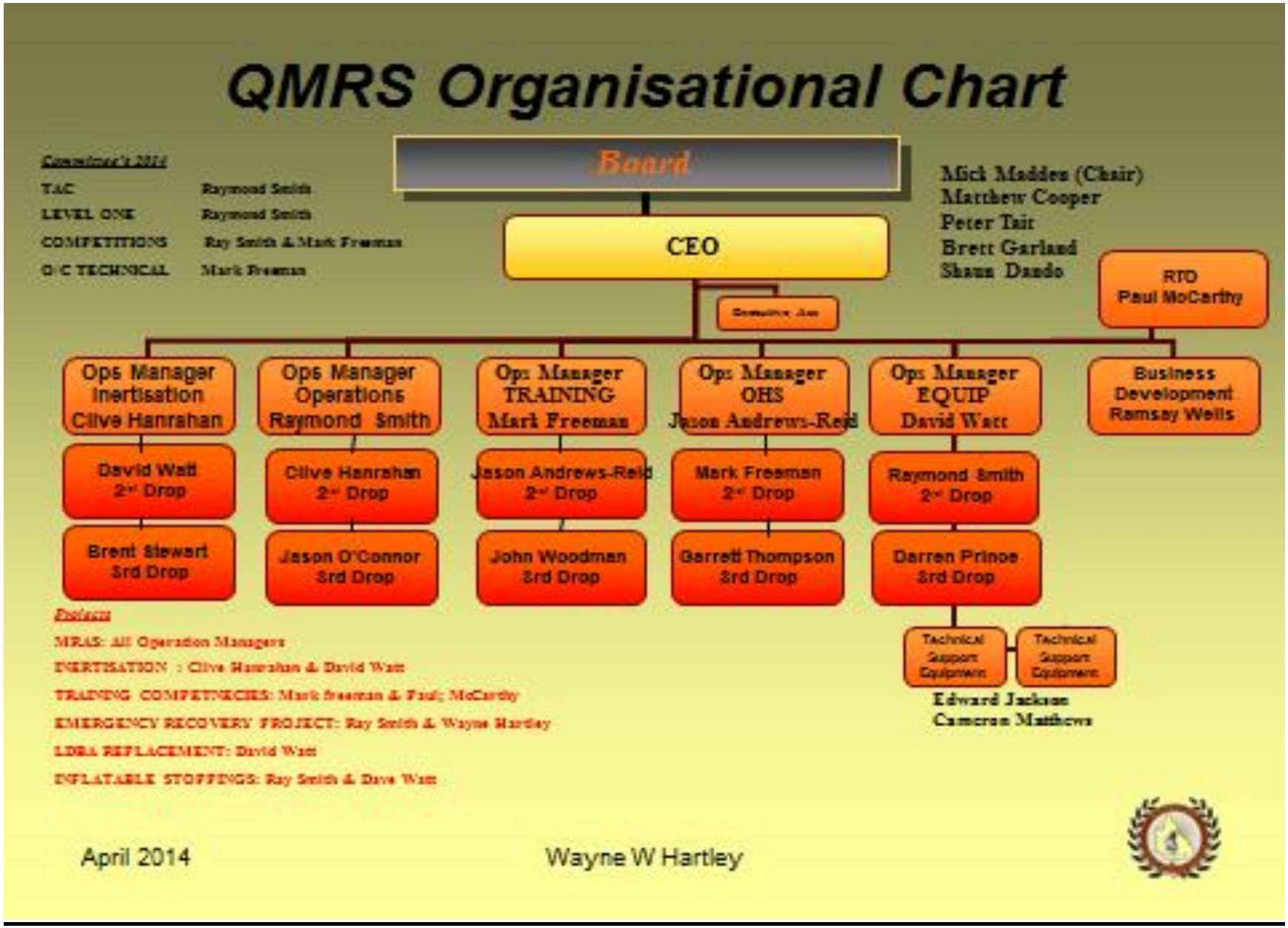
Authorised By: Wayne W Hartley

Appendix 6


QMRS Organisational Chart
Committee's 2014
TAC Raymond Smith
LEVEL ONE Raymond Smith
COMPETITIONS Ray Smith & Mark Freeman
O/C TECHNICAL Mark Freeman
Board
Mick Madden (Chair)
Matthew Cooper
Peter Tait
Brett Garland
Shaun Dando
CEO
RTO
Paul McCarthy
Ops Manager Inertisation Clive Hanrahan
Ops Manager Operations Raymond Smith
Ops Manager TRAINING Mark Freeman
Ops Manager OHS Jason Andrews-Reid
Ops Manager EQUIP David Watt
Business Development Ramsay Wells
David Watt 2nd Drop
Clive Hanrahan 2nd Drop
Jason Andrews-Reid 2nd Drop
Mark Freeman 2nd Drop
Raymond Smith 2nd Drop
Brent Stewart 3rd Drop
Jason O'Connor 3rd Drop
John Woodman 3rd Drop
Garrett Thompson 3rd Drop
Darren Prince 3rd Drop
Technical Support Equipment
Technical Support Equipment
Edward Jackson
Cameron Matthews
Projects
MRAS: All Operation Managers
INERTISATION : Clive Hanrahan & David Watt
TRAINING COMPETENCIES: Mark freeman & Paul; McCarthy
EMERGENCY RECOVERY PROJECT: Ray Smith & Wayne Hartley
LDRA REPLACEMENT: David Watt
INFLATABLE STOPPINGS: Ray Smith & Dave Watt
April 2014
Wayne W Hartley

GLOSSARY AND ABBREVIATIONS

Term	Meaning
Accredited Course	Accredited by the State or National accreditation agency as a training course for which credentials are issued.
Active Team Member	A registered team member that has trained in the last six months.
Active Team	The rescue team inbye the FAB involved in mine rescue operations.
ADSU	Automatic Distress Signalling Unit
Afterdamp	A miner's term for the gaseous products formed in a coal mine after an explosion or fire.
Aided rescue and; Assisted escape	Process whereby surface personnel are directly involved in assisting underground persons to escape from a mine in an emergency situation.
BG 4	A compressed oxygen self-contained closed circuit long duration breathing apparatus.
CABA	Compressed Air Breathing Apparatus.
Competent	A person who has through a combination of training, education and experience acquired knowledge and skills enabling that person to perform correctly a specified task and deemed competent by an accredited organisation.
Don	To put on.
Emergency/EMER	Means a mine emergency due to an actual or imminent occurrence (such as fire, explosion, accident or flooding), which has resulted in the death or injury of a person, or is endangering or threatening to endanger the life or physical wellbeing of a person, or the current and continued operations of the mine.
Explosion	A violent and rapid increase of pressure in a confined space.
Fire	An implemented burning or combustion (chemical reaction) manifested by the evolution of light or heat.
Flammable Gas	Is a gas that, when mixed with air within prescribed limits, will propagate a flame away from a source of ignition.
FPE	Fire protective equipment.
Fresh Air	The atmosphere that meets the requirements of the Coal Mines Safety and Health Act 1999 and Regulation 2001 with regards to flammable and noxious gases, other contaminants and sufficiency of oxygen.
Fresh Air Base (FAB)	A designated safe location either on the surface or underground that is the departure point for active teams. Underground locations to have a positive supply of fresh air.
General Body	The mine atmosphere, which has been determined by a process of cross-sectional atmospheric sampling at a location under consideration.
Heating	See spontaneous combustion.

Term	Meaning
Heat Stress	Failure of the body to cope with high environmental heat and humidity resulting in higher than normal inner body temperature.
Heights and Depths	Work cover QMRS LD standard for a location where it is possible to fall 2 or more metres.
Hot and Humid	A general body that has a wet bulb temperature greater than $26^{O}C$.
Incident	Unplanned event that impacts upon the safety or welfare of personnel, or the continuity of viable mining operations, which requires an effective and timely response in order to contain, or mitigate the situation.
ICT	Incident Control Team. *Maybe referred to as I.M.T at the Minesite*
Incident Control Team	Appropriate personnel established by the Senior Mine Official to advise on control strategies during an emergency.
IMT	Incident Management Team.
Incident Management Team (IMT)	Appropriate personnel established by the Senior Mine Official to advise on control strategies during an emergency.
Irrespirable Atmosphere	An atmosphere, which is unsafe for a person to breathe as a result of either oxygen depletion or the presence of toxic fumes, gases and contaminants.
LAB	Laborious Task
LDBA	Long Duration Breathing Apparatus
LEL	Lowe Explosive Limit
Long duration breathing apparatus	Self-contained breathing apparatus of greater than 60 minutes
MEMS	Mine Emergency Management System
Minimum Equipment	The equipment carried by a mines rescue team to provide for team safety in an active deployment.
MRAS	Mine Re-entry Assessment System
QMRS	The duly constituted Mines Rescue organisation of the Queensland coal industry.
NLAB	Non Laborious task
Nominal Duration	Is the effective life of a breathing apparatus when subjected to a test run on a breathing simulator as per the Australian Standard AS/NZS 1716:1994
Non-operational Team	Is a rescue team held in readiness during an emergency?
Operational Team	Is a rescue team, which may be a standby team or an active team?
Oxygen/Air Escape System	Emergency breathing apparatus to allow persons underground to proceed to a place of safety independently from the underground atmosphere.
POS	Place of Safety (Staging area for immediate response to an inseam incident or event. An area free from sources of danger).
POD	Place of Danger

Term	Meaning
PPE	Personal protective equipment.
PPM	Parts per million.
Registered Member	A mine site that has a Mines Rescue Agreement with QMRS.
Rescue see Aided Rescue	Processes whereby personnel are directly involved in assisting underground persons to escape from a mine in an emergency situation.
Rescue Aided	Processes whereby surface personnel are directly involved in assisting underground persons to escape from a mine in an emergency situation.
Rescue Team	A team normally comprising six Team Members with a Captain and Vice-Captain formed to carry out mines rescue operations.
Risk Assessment	The process used to determine risk control (measures and procedures). See definition from AS4360 priorities by evaluating and comparing the level of risk against predetermined standards, target risk levels or other nominated criteria.
SCBA	Self-contained breathing apparatus.
SSE	The Site Senior Executive or statutory officer as referenced to the Legislation CMHSA 1999.
Self-Contained Self-Rescuer (SCSR)	A self-rescuer that provides the wearer with oxygen from a source self-contained and carried by the wearer.
Self Escape	The process of a person escaping from a mine in an emergency situation without direct assistance from surface personnel.
Spontaneous Combustion	The process by which certain materials can ignite as a result of internal heat that arises spontaneously due to reactions liberating heat faster than it can be lost to the environment.
Standby Team	Is a fully equipped team in readiness to assist the active team? It is an operational team.
Sub Station	Where Mines Rescue Equipment is stored/located from in the event of an incident/accident. A place for team members to be staged prior to or during or post an event/incident/accident
Support Member	Trained persons authorised by the QMRS Delegate utilised to assist in various aspects of emergency control operations with the exception of participation as a member of an operational rescue team due to being out of training in wearing a BG4 within 3 months.
T.A.R.P.	Trigger Action Response Plan
Team Member	A member of a rescue team at a mine and registered with QMRS.
Technical Support Member	A registered member of QMRS as FAB controller or Substation coordinator previously a mines rescue team member.
UEL	Upper explosive limit. The highest concentration of flammable gas in normal air at which flame will propagate away from a source of ignition.

REFERENCES

CMSHA `1999` CMSHR 2001
AS/NZS 4360: 1995
Risk Assessment Tool
MEMS
MRAS
Guideline for: EMERGENCY MINE ENTRY OR RE-ENTRY
Archived OPS0001CD QMRS Guidelines November 2008
QLD Local Counter Disaster Group (Counter Disaster Act)
Emergency Response Manual (ERM)
QMRS Inertisation Unit Mobilisation Procedures
Coal Board Medical & QMRS Medical Guidelines
QMRS Training Manual Cert 3 Underground Coal Mines Rescue RIIERR351A
QMRS Emergency Response and Mutual Assistance Scheme
Mines Rescue Agreement with Coal Mine Operators
Alerts Communication and Response Call out System
Sections 4.7 in this Guideline please see reference from Risk Assessment Mines Rescue Team Operation (A.R.M.E.D)
High Expansion Foam Generator Trials Conducted at Grosvenor mine on the 7th April 2014

QUALITY CONTROL OF DOCUMENT

The record details of changes to the GUIDELINES and the sequence of changes.

AMENDMENT		DISCARD			ISSUE			
No	Date	Section	Page No	Issue No	Section	Page No	Issue No	Amendment
1	10/04/2014	Appendix 6	46	1	Appendix 6	46	1	Update of ORG Chart
		1.6.1 Qualifications	12		1.6.1	12		Remove LEL and UEL %s
		2.0 Team deployment	13		2.0	13		Added MRAS tool should be utilised
		5.10 Fire Fighting	30		5.10.1	30		High Expansion Foam Generator Examples Added
		References	51		References	51		As Above Point & Archived Guidelines and Mine Entry Re-entry Guidelines
		1.2 Heat and Humidity	9		1.2	9		Ventilation should be considered when ventilation is minimal