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1.0 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 with in 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.***

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.

Section		References
2.0 QMRS STRUCTURE, FUNCTIONS, RESPONSIBILITIES	**QMRS** **2.1 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 the following Functions and Performance Criteria: Obligations of Provider of Services at Coal Mines Section 47 CMSHA 1999 OBLIGATIONS: Section 47 47. A person who provides a service at a coal mine has the following obligations- (a) to ensure the safety and health of coal mine workers or other persons is not adversely affected as a result of the service provided. (b) to ensure the fitness for use of plant at the coal mine is not adversely affected by the service provided. PERFORMANCE CRITERIA: Section 233 (1) The mines rescue performance criteria for the provision of mines rescue services for underground mines by an accredited corporation are that the corporation - a) provides appropriate mines rescue training programs; and b) provides equipment and resources to perform its obligations under mines rescue agreements; and c) ensures mines rescue equipment is maintained, tested and certified to any specifications by its manufacturer; and d) effectively performs audits or other exercises to show the corporation's ability to respond to an emergency; and e) provides an effective procedure for coal mines operators to help each other in an emergency; and f) does anything else prescribed under a regulation… PERFORMANCE CRITERIA Section 234 (1) Within one month after the end of each financial year, each accredited corporation must give the Minister a written report about whether it complied with the performance criteria in the year…	Coal Mining Safety and Health Act 1999 and Regulations 2001

2.0
QMRS STRUCTURE, FUNCTIONS, RESPONSIBILITIES (Cont.)

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-
(a) the minimum mines rescue training to be provided under the agreement;
(b) the procedure for coal mine operators to help each other in an emergency;
(c) how inertisation equipment controlled by the accredited corporation is to be used at the mine;
(d) 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-
(a) 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
(b) sufficient resources for training persons in operating the equipment.

2.0 QMRS STRUCTURE, FUNCTIONS, RESPONSIBILITIES (Cont.)	**2.2 BOARD OF DIRECTORS** The QMRS Board of Directors prescribe the terms of any "***Mines Rescue Agreement"*** with Coal Mine Operators of underground coal mines to provide: 1. Training for 'Team Members' employed by the coal mine operator, in emergency and non-emergency rescue techniques; and 2. Assistance in providing the ***aided rescue*** capability described in the coal mine operator's ***'Emergency Safety Management Plan'***; ***Emergency Evacuation Hazard Management Plan.*** (EEHMP) 3. Ensure support for rescue services and facilities to deal with emergencies in underground mines, and to ensure that the Service supports any such emergency. 4. Ensure that adequate rescue equipment is available to support service members in dealing with such emergencies. 5. Ensure that persons maintain technical knowledge for advice in Mines Rescue Services to the mine operators in an emergency. The Board of Directors may, as required, introduce, alter or delete provisions relating to QMRS Standards associated with mines rescue equipment, equipment maintenance, mines rescue training and Rescue Sub-Stations. Based on Risk Management Philosophies. The Board of Directors may appoint a State Manager who will report to the Board on all matters relating to QMRS Performance Criteria. The Board of Directors may appoint a Technical Advisory Committee (with the appropriate skills and qualifications) to provide advice on Mines Rescue Policy and associated Technical Issues. **2.3 COAL MINE OPERATORS' RESPONSIBILITIES** • A coal mine operator must be a party to a **"*Mines Rescue Agreement*"** for the coal mine operator's mine. • Each coal mine operator who is a party to a **"*Mines Rescue Agreement"*** must contribute funds to allow an accredited Corporation to provide Mine Rescue Services. • An underground coal mine operator must provide a mines rescue capability for the mine. • A person must not use a mine for mining while the coal mine operator of the mine fails to comply with the requirements of Section 223, 224, 225. ***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 a underground mine which has or may have an irrespirable atmosphere***.	• QMRS Ltd. Articles of Association Coal Mining Safety and Health Act 1999 • Section 223 • Section 224 • Section 225

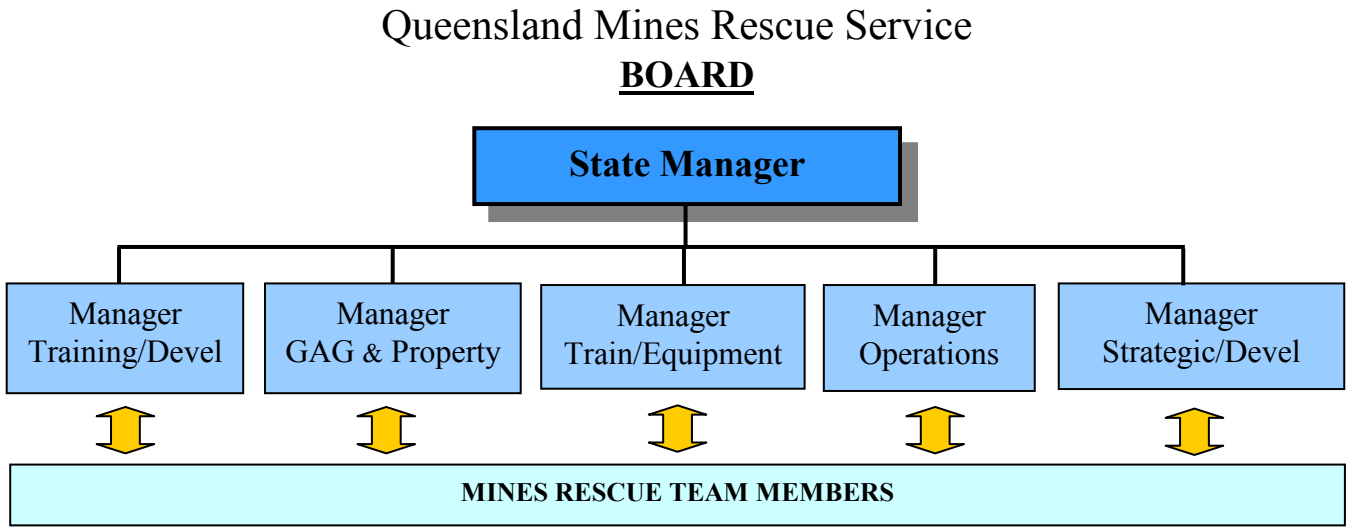
2.0 EMERGENCY RESPONSE STRUCTURE

2.4 QMRS STRUCTURE

The QMRS has the following facilities and is structured on a STATE basis with major facilities in Dysart and Blackwater.

	Location	Telephone	Facsimile	Mobile
Head Office	45 Garnham Drive, Dysart	07 4958 2244	07 4958 2740	0419797216
Dysart	45 Garnham Drive, Dysart	07 4958 1422	07 4958 2399	0419791087
Blackwater	43 Doon Street, Blackwater	07 4982 5369	07 4986 1124	0419791601
Inertisation Facility	45 Garnham Drive, Dysart	07 4858 1422	07 4958 2399	0419793401

2.4 ORGANISATIONAL CHART



3.0 GENERAL FUNCTION OF THE QLD. MINES RESCUE SERVICE	**3.1 QUEENSLAND 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.	Coal Mining Health and Safety Act. 1999
4.0 ROLES & RESPONSIBILITIES OF QMRS STAFF, TEAM MEMBERS & OTHERS	**4.1 EMERGENCY OPERATIONS, GENERAL** 1. 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. 2. 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. 3. 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 equalivent, 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. 4. 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.	

4.0 ROLES & RESPONSIBILITIES OF QMRS STAFF, TEAM MEMBERS & OTHERS (Cont.)

4.2 ROLES AND RESPONSIBILITIES

4.2.1. QMRS State Manager 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.

QMRS Emergency Procedures

Mutual Assistance Scheme

QMRS Articles of Association

4.2.2. QMRS Operational Manager or Delegate:-

In an emergency situation the QMRS Operations Manager or delegate (responding to the emergency) is responsible to the State Manager 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.

QMRS Emergency Procedures

Mutual Assistance Scheme

4.0 ROLES & RESPONSIBILITIES OF QMRS STAFF, TEAM MEMBERS & OTHERS (Cont.)

4.2.3. 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.

Emergency Response Manual (ERM)

4.2.4. QMRS Inertisation Coordinator or Delegate

Following a request from the ICT for use of inertisation equipment, the Inertisation Coordinator will arrange for the deployment of equipment to the affected site and the necessary logistical support required for the expected period of operation.

QMRS Inertisation Unit Mobilisation Procedures

4.2.5. 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

Coal Board Medical & QMRS Medical Guidelines

4.2.6. 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.

MNCUO30a

4.0 ROLES & RESPONSIBILITIES, OF QMRS STAFF, TEAM MEMBERS & OTHERS (Cont.)	**4.2.7. 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. **4.2.8. 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. **4.2.9. 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.	MNCUO34a MNCUO36a MNCU036a

5.0 EMERGENCY RESPONSE SYSTEM	**5.1 STANDBY SYSTEM** 1. QMRS EMERGENCY RESPONSE is through the Queensland Fire and Rescue Service "Fire Communication Centre" in Rockhampton on 07 49226455 – the operator 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 07 4922 6455. 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). **5.2 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 Members call-out. • Initiation of the Duty Card System. QMRS Responsibilities include: • Notification of the other Station to stand-by status • 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.	QMRS Emergency Response and Mutual Assistance Scheme QMRS Emergency Response and Mutual Assistance Scheme MNCUO30a

5.0 EMERGENCY RESPONSE SYSTEM (Cont.)	**5.3 QMRS TEAM MEMBERS** The Coal Mining and Safety Act 1999, operators of underground coalmines, 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". 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, Mine Manager and Mines Rescue Coordinator has access to a monthly updated register of Mines Rescue Team Members.	Mines Rescue Agreements with Owners DME Guidelines for the Determination of Mines Rescue Capability (1998)
	5.4 (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, and Blackwater.	QMRS Sub Station Equipment Listing First response trailer equipment listing.

5.0 EMERGENCY RESPONSE SYSTEM (Cont.)	**5.5 (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. • F500 fire fighting wetting agent (foam). • Non-ferrous tool. **5.6 INERTISATION EQUIPMENT** This equipment currently comprises two GAG 3A Jet Engines, associated fuel, water supply, support equipment. The equipment is stored at Dysart Rescue Station to enable mobilisation to an affected mine.		QMRS Rescue Station Equipment Listing QMRS Inertisation Equipment Listing QMRS Emergency Inertisation Operations
6.0 QMRS EMERGENCY RESPONSE GUIDELINES	The emergency response guidelines provide a framework for Incident Control Teams to manage an emergency situation and provide Incident Controllers, QMRS Operational Managers and Team Members with direction in regards to their responsibilities and conduct in an emergency.	In an emergency situation the Senior Mine Official, Underground Mine Manager or the Site Senior Executive should establish an ICT to manage and control the incident. Responsibilities are generally defined as: • The underground Mine Manager or the Senior Mine Official present has statutory responsibility for the management and control of the emergency operation. • An Inspector of Mines has the authority to suspend or limit the intervention where the Inspector deems that persons are being exposed to unacceptable levels of risk. • The Industry Safety and Health Representative (CFMEU) can provide knowledge and expertise on underground safety issues. Can also under section 167 give a “directive to Suspend Operation for Unacceptable” Level of Risk. • The QMRS Operations Manager can provide specialist knowledge and expertise on rescue, control, exploration and recovery/ restoration techniques and in particular, the deployment of the Mines Rescue Teams. • As the Mines Rescue delegate the QMRS Operations Manager maintains responsibility for the detailed mines rescue operations and should ensure that if utilised, rescue teams are deployed in accordance with these Guidelines and standard operating guidelines. • The QMRS Operations Manager should reconsider deployment of Mines Rescue Teams where he deems that persons are being exposed to unacceptable levels of risk, or where the techniques and procedures proposed are not in accordance with these Guidelines and standard operating procedures.	Mines Emergency Safety Management Plan QMRS MEMS CMSHA CMSHR

6.0 **QMRS EMERGENCY RESPONSE GUIDELINES** (Cont.)		• In the event of an incident involving the loss of life, Police officers act as the Coroner's representative and have statutory responsibilities for investigation and interviewing, reporting, and the removal of bodies. QMRS act under the authority of the Police. The Local Counter Disaster Officer (usually the Regional Police Senior Officer) can also access and authorise resource ancillary equipment from outside the mining industry.	Qld Local Counter Disaster Group (Counter Disaster Act)
6.1 **NATURE OF THE EMERGENCY**	**1.** What is the nature of the emergency/incident: • ignition • explosion • spontaneous combustion • fire • fall of ground/entrapment • fall of ground/wind blast • outburst • inrush • unknown or unidentified **2.** What is the intensity of the emergency/incident: • blast damage • colour and extent of smoke • visible flame • type and level of gases produced • ventilation status • information from survivors	Static incidents such as a fall of the roof, have historically had a minimum likelihood of developing into an uncontrolled event and may enable a quick resolution with early intervention. Dynamic incidents such as fires, spontaneous combustion or explosions may escalate into uncontrolled events. They warrant extreme caution and a detailed evaluation of all relevant information and factors utilising data that is accurate, reliable (timely, valid location/s, correctly interpreted), and trended. Determination of the nature of the emergency/incident and an evaluation of its intensity will enable an assessment to be made of the: • extent of disruption to essential services such as ventilation, mine monitoring, methane drainage. • degree of confinement to a specific face, heading, panel or district. • nature and extent of injuries to survivors. • potential for escape, rescue or re-entry.	Reference 7.1
6.2 **ACTION REQUIRED**	What action or response is required to remedy the emergency/incident: • escape, rescue or extrication of persons? (see 6.3) • control of a situation (e.g. fire-fighting, sealing)? (see 6.4) • exploration and recovery of bodies? (see 6.5)	Establishing the desired outcomes provides a framework for determining the type, extent, reliability and accuracy of data required to identify and evaluate potential strategies. It will be a factor in determining acceptable risk levels and also provide a framework for evaluating overall logistics. In a non-emergency situation within a mine for the recovery of bodies or restoration of operations there will be a pre-planned operation using a risk management approach. The 'Guidelines' References 7.2, 7.3, 7.5, 7.6 and 7.7 may be adopted as a framework for identifying the limits associated with the proposed operation.	

6.2 ACTION REQUIRED (Cont.)	• exploration and restoration of operations? (see 6.6) • surface emergency procedures? (see 6.3)		
6.3 ESCAPE, RESCUE OR EXTRICATION	**1.** Are people trapped or unaccounted for?	Identification of the number of persons endangered (if any) may enable the relative severity of the emergency to be quickly assessed.	Reference 7.2
	2. What is the nature of the environment? • flammable. • toxic. • oxygen deficient. • heat and smoke affected. • exposed to unstable strata, heights or depths..	Depending upon the type, extent and limits of gases present or suspected, the nature of the environment may impact upon the potential for escape or survival prospects, or predicate and limit response strategies: • a flammable atmosphere may prevent rescue and re-entry particularly if there is the likelihood of an active ignition source. • a toxic or oxygen deficient atmosphere may limit the duration of rescue and require the use of breathing apparatus. • a heat and smoke affected atmosphere may similarly limit the duration and type of rescue. The nature of the emergency also needs to be evaluated in respect to the evolution of gases and the potential to develop a hazardous environment over time.	Reference 7.3 and 7.4 Reference 7.5 and 7.6 Reference 7.7
	3. Where are the persons known or expected to be, and how long have they been trapped or missing?	An evaluation of the nature of the emergency and mine environment, coupled with the known/expected location of personnel, the duration of their exposure, and the availability and type of escape systems may determine the escape/survival potential.	Mine EEHMP
	4. What are the prospects for their escape or survival and can they be enhanced?	What escape strategies are available to endangered personnel: • location and numbers of SCSR/CABA at caches/change-over/quickfill stations. • place of safety or refuge chambers/barricades • signage, lifelines. • communications and vocational devices. • location, accessibility and security of escape-ways/secondary escape-ways. • training in mines rescue, escape and survival techniques. • materials and equipment for rescue, escape and survival • transport systems. • man access at surface doors and air-locks.	Mine EEHMP

6.3 ESCAPE, RESCUE OR EXTRICATION (Cont.)	**5.** What is the nature of the mining environment and operation? • depth, type of overburden. • seam thickness, dip. • propensity to spontaneous combustion. • type and make of seam/strata gases. • mining method; longwall, pillar - partial or full extraction, development. • ventilation system and quantities. • mine monitoring system. • mine communication system. • segregation of intakes. • transportation systems. • stopping/sealing methods and materials. • fire and explosion suppression systems. • other materials; plastics/synthetics • water make. • surface environmental constraints. • gas management and drainage systems. • location and numbers of SCSR caches/change-over stations, CABA/refill station. • escape-ways, primary and secondary or alternative. • man access doors at surface entry seals.	An understanding of the mining environment and operation is necessary in order to: • identify the type, nature and extent of the hazards contained within the environment, e.g. presence of major gas and ignition sources • assess the contribution of these factors to the incident, their potential interaction, and the stability of the environment or atmosphere • determine the potential for development of a secondary incident, e.g. explosion, fire • evaluate factors that may limit or reduce the potential for escape or rescue.	
	6. Is rescue a necessary and viable strategy?	An evaluation of the nature of the emergency and mine environment, coupled with the known/expected location of personnel, the duration of their exposure and the availability, type and effectiveness of escape/survival systems may determine the escape/survival potential. Where escape is unlikely but survival possible the potential for rescue can be assessed and risks evaluated. If the mine environment is such that survivors require rescue the environment will similarly preclude fresh air rescue by untrained persons.	

6.3 ESCAPE, RESCUE OR EXTRICATION (Cont.)	**7.** What escape or rescue systems and technologies are necessary and available, can they be readily deployed and effectively utilised: • inertisation coupled with refuge and rescue. • large diameter boreholes. • emergency response vehicles. • mine rescue teams. • other emergency services.	Depending upon the type, extent and limits of gases present or suspected and the nature of the emergency the overall situation may dictate that alternative rescue technologies be utilised due to unacceptable risk levels to rescue personnel as determined by the ICT. Alternative rescue technologies and specialist services can be resourced through the Queensland Mines Rescue Service.	Reference 7.2 7.3
6.3 ESCAPE, RESCUE OR EXTRICATION (Cont.)	**8.** Can all personnel, either on the surface or underground, be safely and effectively deployed and what measures need to be introduced to ensure their safety?	Rescue operations from flammable atmospheres is prohibited in a mine where an ignition source has not been isolated. Rescue operations may be conducted in a mine that contains a *flammable atmosphere* in another location providing appropriate measures have been introduced for elimination, isolation and control of active ignition sources. These may include, but not limited to isolation of power, anti-static clothing, non-sparking tools and approved equipment The mine atmosphere shall be continuously monitored to ensure that atmospheric conditions are known and trended. This information should continuously be communicated to the ICT. Nomex or equivalent clothing and suitable PPE should be worn by rescue teams when entering atmospheres likely to contain flammable gas concentrations at more than the 60% LEL. Communication should be maintained between the active team and the FAB/ with agreed systems of emergency communication established before entry. An airlock is utilised by the teams to enter into or egress from an atmosphere greater than the upper exclusion limit (e.g. 140% UEL). Before establishing the control centre and operations base in existing surface infrastructure, due consideration must be given to the possible occurrence, magnitude and effects of any secondary event. If possible, barriers should be erected on the surface to prevent unauthorised access into blast windows of all surface entries. To obtain atmosphere samples from surface entries, after initial establishment of the sampling point, the sample line should extend at least 100m minimum from the entry with due regard given to blast direction.	References 7.3 7.5 7.6 7.7

6.3 ESCAPE, RESCUE OR EXTRICATION (Cont.)		Due consideration should be given to direction of prevailing winds over a 24 hour period in relation to atmospheric contaminants from surface entries with continuous monitoring points (audible alarm) established at appropriate locations. All surface personnel should carry on their person escape breathing apparatus when in designated areas, (underground, etc.) All non-mining personnel must receive instruction on the use of escape breathing apparatus. Evacuation procedures including designated muster points should be established and made familiar to all personnel.	
	9. When people have been trapped or pinned under debris or heavy equipment and cannot be removed by hand, then hydraulic, pneumatic and cutting tools are needed for their extrication. **10.** When people require extrication from heights and depths, victims and rescuers are exposed to hazards unique to those situations.	Rescuers should be aware that: • advanced life support techniques such as treatment of crush syndrome and haemorrhage may need to be implemented as victims are freed. • pivotal points of debris and equipment may be altered during extrication. • heat transfer from cutting tools to victims may cause burns. Only persons currently trained and accredited in vertical mobility should be utilised for the extrication of personnel from heights and depths.	
6.4 CONTROLLING A SITUATION	**1.** What is the nature of the environment: • Flammable. • Toxic. • Oxygen deficient. • Heat and smoke affected.	Depending upon the type, extent and limits of gases present or suspected the nature of the environment may impact upon the potential introduction and effectiveness of control strategies: • An uncontrolled potentially explosive atmosphere will prevent deployment of rescue teams, particularly if there is the likelihood of an active (active combustion with flame) ignition source. • A toxic or oxygen deficient atmosphere may limit the duration of rescue and require the use of breathing apparatus. • A heat and smoke affected atmosphere may similarly limit the duration and type of rescue. The nature of the emergency also needs to be evaluated in respect to the evolution of gases and the potential to develop a hazardous environment over time.	Reference 7.2 Reference 7.3 7.4 Reference 7.5 7.6 Reference 7.7

6.4 CONTROLLING A SITUATION (Cont.)	**2.** What is the nature of the mining environment and operation: • depth, type of overburden • seam thickness, dip. • propensity to spontaneous combustion. • type and make of seam/strata gases. • gas management plans and systems. • mining method; longwall, pillar extraction partial or full, development. • ventilation system and quantities. • segregation of intakes. • transportation systems. • stopping construction, sealing methods, material standards. • fire and explosion suppression systems. • other materials; plastics/synthetics • water make. • surface and environmental constraints. • mine monitoring system. • gas drainage system. • communication systems. • location and numbers of SCSR caches/change-over stations. • escape-ways, primary and secondary or alternative man access doors at surface entry seals.	An understanding of the mining environment and operation is necessary in order to: • identify the type, nature and extent of the hazards contained within the environment, e.g. presence of major gas and ignition sources. • assess the contribution of these factors to the incident, their potential interaction, and the stability of the environment or atmosphere. • determine the potential for development of a secondary incident, e.g. explosion, fire. • evaluate factors that may limit or reduce the potential introduction and effectiveness of control strategies. • relationship of emergency equipment availability and locations with the type of incident and potential responses.	
	3. What intervention and control techniques could be utilised, are they available and can they be readily deployed: e.g. **location, type and quantity of inseam and surface equipment.** • ventilation • inertisation • high expansion foam (fire fighting equipment	Depending upon the type, extent and limits of gases present or suspected and the nature of the emergency the overall situation may dictate that alternative intervention techniques be utilised due to unacceptable levels of risk to rescue teams.	Reference 7.2 7.3

6.4 CONTROLLING A SITUATION (Cont.)	• emergency response vehicles (and accessories) • sealing • flooding • mine rescue teams **4.** Can mine rescue teams be safely and effectively deployed? What measures need to be introduced to ensure their safety?	Rescue and related operations from an uncontrolled potentially explosive atmosphere is prohibited in a mine where an ignition source is likely. Following Risk Management Practices the decision for rescue operations may be conducted in a mine that contains a flammable atmosphere providing appropriate measures have been introduced for identification, elimination, isolation and control of active or potential ignition sources. These may include isolation of power, anti-static clothing, and non-sparking tools and approved equipment Atmosphere inertisation techniques may be implemented. The mine atmosphere shall be continuously monitored to ensure that atmospheric conditions and trends are known. Communication should be maintained between the active team and the FAB with systems of emergency communication established before entry. The mine atmosphere shall be continuously monitored to ensure that fresh air conditions (as per Coal Mining Safety and Health Regulation 2001) are maintained and heat and humidity guidelines are observed as appropriate.	Reference 7.3 7.5 7.6 7.7
	5. Can the restoration and repair be completed without breathing apparatus, what measures need to be introduced to ensure the safety of workers?		Reference 7.3 7.5 7.6 7.7
6.5 EXPLORATION AND RECOVERY (OF BODIES)	Re-entry and exploration within a mine, or the recovery of bodies should be a pre-planned operation using a risk management approach.	The Guidelines for rescue and extrication of personnel (Section 6.3) may be adopted as a framework for identifying the risks associated with the proposed operation. The 'Guidelines' References 7.2, 7.3, 7.5, 7.6 and 7.7 may be adopted as a framework for identifying the limits associated with the proposed operation. 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.	Section 6.3 page 16 and AS/NZS 4360: 1995 Section 1 Page 1 QMRS PROCEDURES Risk Assessment Tool

6.6 EXPLORATION & RESTORATION OF OPERATIONS	All mines rescue operations both emergency and non-emergency must be conducted using a risk management approach.	The Guidelines for rescue and extrication of personnel (Section 6.3) may be adopted as a framework for identifying the risks associated with the proposed operation. The 'Guidelines' References 7.2, 7.3, 7.5, 7.6 and 7.7 may be adopted as a framework for identifying the limits associated with the proposed operation.	Section 6.3 page 16 and AS/NZS 4360: 1995 Section 1 Page 1 QMRS Guidelines Risk Assessment Tool

7.0 GUIDELINE REFERENCES

Reference 7.1

NATURE AND INTENSITY OF INCIDENT

Notes:

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).

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.

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.

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

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

CH_4% in air	Maximum 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

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.

7. Coal dust in suspension can lower the ignition temperature of methane from 650 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.

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.

Reference 7.2

RISK CATEGORIES

1. Rescue teams may be deployed within acceptable risk categories to affect rescue.
2. Acceptable risk categories are:

Category 1	**Lives at risk**
Category 2	**No life at risk/planned operation**

Reference 7.3

EXPLOSIBILITY

1. CH_4, H_2, and CO are flammable products of mine fires and explosions. Consideration must be given to the contribution of all these gases in explosive mixtures.
2. Entry into a mine should not be effected when the atmosphere in the general body is within the exclusion limits as below:

Risk Category	Entry Exclusion Limits For "Explosive Mixtures" in the presence of sufficient OXYGEN to support Combustion		
	Lower Explosive Limit		**Upper Explosive Limit**
Oxygen (O^2) % present to support combustion			
Cat 1	80% LEL	**-NO ENTRY-**	140% UEL ignition source not confirmed
Cat 2	60% LEL	**-NO ENTRY-**	160% UEL ignition source not confirmed

The LEL and UEL percentages can be accurately determined by integrating gas chromatographic analysis with Hughes and Raybold explosivity determination. The LEL can also be estimated using outputs from a multi-gas detector.

Example 1

The LEL of a mixture of gasses from a fire containing 1 % CH4, 1% H2 and 1% CO is calculated as follows:

$$1\%\ CH4 = \frac{100 \times 1}{5} = 20\%\ LEL$$

$$1\%\ H2 = \frac{100 \times 1}{4} = 25\%\ LEL$$

$$1\%\ CO = \frac{100 \times 1}{12.5} = 8\%\ LEL$$

therefore adding the three together - the flammability of the mixture is **53% LEL.**

Example 2

The UEL of a mixture of gasses from a fuel rich fire containing 15% CH4, 5% H2, and 5% CO is calculated as follows

$$15\%\ CH4 = \frac{100 \times 15}{14} = 107\ \%\ UEL$$

$$5\ \%\ H2 = \frac{100 \times 5}{74} = 7\%\ UEL$$

$$5\%\ CO = \frac{100 \times 5}{74} = 7\%\ UEL$$

therefore adding the three together - the flammability of the mixture is **121% UEL**

Reference 7.3 (Cont.)

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.

3. Information necessary to make a well considered decision on Risk Management logic:

Nature of Gases When evaluating the explosivity (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

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.

Gas Sampling 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.

4. 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 explosivity 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.

Reference 7.3 (Cont.)

- 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 explosivity of the mixture. High off-scale readings may indicate an explosive atmosphere.
- If low oxygen readings are indicated (less than 12%) methane and explosivity 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.

- 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 explosivity 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 $\pm$ 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 an atmosphere of >60% LEL to <80% LEL **if a trend indicates an increasing** explosivity 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 CO2) 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.

Reference 7.4

TOXICITY

1. 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.
2. 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.
3. 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.
4. **Breathing apparatus will be worn in all circumstances when the atmosphere contains more than 30ppm CO, 1.25% CO_2, and 10 ppm H_2S and 3ppm NO_2, or if other toxic fire products are likely to be present.**
5. Due to the insulating effects of CO_2 and its reaction with 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.

Reference 7.5

OXYGEN DEFICIENCY

1. There are no entry limits for trained and currently accredited Team Members wearing breathing apparatus in an oxygen deficient environment.

2. Rescue operations conducted without breathing apparatus will be in fresh air conditions as defined under the Coal Mining Safety and Health Regulation 2001:

O^2	CO_2	CO	H_2S	NO_2	CH4
$\geq$19%	<1.25%	$\leq$30 ppm	$\leq$10 ppm	$\leq$3 ppm	<2.5%

When determining O^2, CO and CO_2 levels gas analysis needs to be accurate, reliable (timely, valid location/s, correctly interpreted) and trended.

Reference 7.6

HEAT AND HUMIDITY

QMRS procedures for team operations in a hot and humid environment underground must be strictly adhered to, so as to prevent the onset of potentially serious symptoms of heat exhaustion.

Personnel should be only required to perform one period of duty (mines rescue activity) in a hot environment in each twenty-four hour period. 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, advice to people to inform the leader of any sign or symptoms of heat stress. Deployment times for trained team members based on the wet bulb temperature and the difference between wet and dry bulb temperatures are given over. 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.

The following precautions are recommended for work in hot and humid conditions.

Reference 7.6 (Cont.)

Before entering

1) Team members should have rested, preferably in a cool place and be properly hydrated by drinking water.
2) The drinking of coffee should be avoided.
3) Team members having a cold or cough or other infection should not be allowed to work in hot and humid conditions.
4) Team members must be reminded of the signs and symptoms of heat illness and instructed to inform the captain at the first sign or symptom.
5) Team members who have consumed a significant quantity of alcohol in the previous 24 hours may suffer from dehydration and should not be allowed to work in hot and humid atmospheres.

In the hot location

1) Work should be done at a slow even pace with a minimum of movement.
2) Rest pauses should be frequent and taken in turn.
3) The team leader should watch his team members carefully; all team members should watch for each other for signs and symptoms of heat illness.
4) The leader should not engage in physical work. He should watch his team members, regulate the work and the rest periods and plan for the return trip.
5) The use of personal cooling devices should be considered.

After exposure

1) Team members should not cool down too quickly and should wait until sweating ceases before having a shower. They should lie down while waiting and rest after the shower.
2) Team members should rest as much as possible and do not do heavy work or drive a car a long distance.
3) Lost sweat should be replaced by drinking fluids such as water.
4) Dry clothing or blankets should be made available at FAB.

The following table defines permissible operating periods for teams in hot and humid atmospheres:

Total Deployment Times For Rescue Teams Wearing Drager BG4 (including return to FAB)

Percent Relative Humidity	100-85%	84-73%	75-62%	67-53%	60-45%	
σ Temperature ^{0} Celsius	0-2^{0}	3-4	5-6	7-8	9-10	difference between wet and dry
Wet Bulb Temperature		Duration Of Exposure (minutes)				
26^{0}	95	100	105	110	115	
27	**85**	**85**	**90**	**95**	**100**	
28	75	75	80	80	85	
29	**65**	**65**	**70**	**70**	**75**	
30	55	60	60	65	65	
31	50	50	55	55	60	
32	45	45	50	50	50	
33	40	40	45	45	45	
34	35	35	40	40	40	
35	30	35	35	35	35	
36	30	30	30	30	30	
37	25	25	30	30	30	
38	25	25	25	25	25	
39	20	20	20	25	25	
40	20	20	20	20	20	
41	15	20	20	20	20	
42	15	15	15	15	20	
43	15	15	15	15	15	
44	15	15	15	15	15	
45	10	10	10	15	15	

σ Temperature = Difference between wet and dry bulb temperatures

Reference 7.7	**VISIBILITY** Following an incident, visibility can be seriously affected. This can lead to disorientation and impair the escape of survivors, and also impact upon re-entry by rescue teams. Where visibility is limited survivors and/or rescuers should use a guideline, or be fastened together with a link line if smoke is dense or visibility seriously affected. In some roadways rail track work, pipelines and conveyors can be used as a guideline by sliding a foot or hand along the rail, pipe or structure. It may also be advantageous to carry the cap lamp in hand. Telephone cables or radio aerials installed by teams from the FAB to the working area could be used as guidelines.Where visibility is expected to be limited any rescue attempt must be planned using a rigorous risk assessment approach. Poor visibility significantly reduces a teams 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.

8. PROCEDURE FOR THE DEPLOYMENT OF RESCUE TEAMS

PROCEDURE 8.1	**RESPONSE BY LESS THAN 5 PERSONS** This procedure applies only to straight forward, non-laborious tasks e.g. establish an atmosphere monitoring point, obtain an air quantity reading or gas sample, and must be authorised by the QMRS Operations Manager assigned to the ICT. A team of less than five persons who are active Team Members, may enter an irrespirable atmosphere using SCBA provided the following controls are established: • A manned and equipped Fresh Air Base. • Entry into the irrespirable atmosphere is only permitted for teams of two or more members. • Each team member must return to the FAB prior to the low warning whistle activating on any CABA units or with more than 30bar pressure in all BG4 suits. • 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% of its capacity for CABA. • Prior to departure from FAB each team member must have a minimum of 170bar pressure in the oxygen cylinder or 80% in a CABA unit. • Each team member must carry a belt-worn SCSR. • A minimum of two members will be on standby at an established FAB to maintain communication, monitor conditions and initiate response if required. • Permitted travelling distance up to 250 metres. • Communications should be maintained between the team and the FAB. Distances greater than 250 metres and up to 600 metres are managed by QMRS procedure 8.1A.
PROCEDURE 8.1A	In addition to procedure 8.1 the following shall apply. • Each team member will be equipped with a long duration self-contained breathing apparatus. • A standby team with a minimum of four members at the FAB.

PROCDURE 8.2	**NORMAL OPERATIONS (TEAMS OF 5 OR MORE PERSONS)** **If response to an incident requires the deployment of persons beyond 250 metres, then the following shall be established.** • The team will comprise no less than five (5) active Team Members. • Each team member will be equipped with a long duration self-contained breathing apparatus. • 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**. • Prior to departure from FAB each team member must have a **minimum of 170bar cylinder pressure** for BG4. • A manned and equipped Fresh Air Base. • The extent of the task assigned to the team will be limited to enable the team to return to the FAB within two hours of going under oxygen. • The team must return to the FAB prior to low warning whistle activating on any CABA units or with more than 30bar pressure in all BG4 sets • If ***radio communications is not available or not maintained,*** the team **shall not travel beyond 30 minutes** from the FAB.
PROCEDURE 8.3	**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 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; 8 x BG4 O^2 cylinders;(if BG4 are in use) drinking water; FAB relocation plan; 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.
PROCEDURE 8.4	**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. In a **Category 1 (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.

PROCEDURE 8.4 (Cont.)	In a **Category 2 (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. 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.
PROCEDURE 8.5	**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 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, 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.
PROCEDURE 8.6	**RETURN TO THE FAB** The team leader must ensure that an active team returns to the FAB within two hours, or within the designated time period for the particular operation, or the time calculated under hot and humid conditions. An active team must return to the FAB before their task is completed, if any of the following (situations) arise: • Breathing apparatus failure. • Insufficient cylinder pressure to meet FAB return standard. • Loss of communication (where required by these Guidelines). • Failure in an item of minimum equipment that affects team safety. • An injury or adverse physical or mental condition occurs to or is observed in a team member. • An unexpected adverse condition is encountered or an adverse alteration to the environment. • The team leader is instructed to return by the FAB Controller. Note. If, for the reason of safety, the team captain may go to fresh air other than FAB. The FAB Controller must be advised and approve the actions of the team captain.

PROCEDURE 8.7	**OPERATIONAL TIMES (EXCLUDING SECTION 7.6)** 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.
PROCEDURE 8.8	**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 and 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 roles.

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.
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	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 well being 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.
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	Workcover QMRS LD standard for a location where it is possible to fall 2 or more metres.

Term	Meaning
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.
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.
LEL	Lower explosive limit. This is the concentration of flammable gas in air above which a flame will propagate away from a source of ignition.
Long duration breathing apparatus	Self contained breathing apparatus of greater than 60 minutes
Minimum Equipment	The equipment carried by a mines rescue team to provide for team safety in an active deployment.
QMRS	The duly constituted Mines Rescue organisation of the Queensland coal industry.
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.
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.

Term	Meaning
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.
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 with in 3 months.
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.

Queensland Mines Rescue Service

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

Guidance in the application and duration of Breathing Apparatus

CYLINDER SIZE/DURATION/TIME

		O^2	2 x 6.8 lt cyl. CABA		1 x 9 lt cyl. CABA	
		100%	100%	80% full	100%	80% full
With 80% rule 'Capacity'		4 hrs	90	72	40	32
With 50% safety margin		2 hrs	45	36	20	16
ENTRY	1/3 rule	80 min	30	24	13	12
EXIT	2/3 rule	160 min	60	48	26	24

Performance Standard: @ 3 kilometre per hour walking speeds/travel = 3000 metres per hour
5 minutes = 250 metres 12 minutes = 600 metres
"It may be determined through risk assessment to apply 4 km hour or greater, determined on sound risk assessment procedures on the conditions."

B/A TYPE	MINIMUM TEAM V Distance/Time		Controls
Twin Cylinder CABA/BG4 or One Cylinder CABA	2 Team IN & 2 Team OUT	250 metres or 5 minutes	Line of SIGHT
Twin Cylinder CABA or BG4	2 Team IN & 4 Team OUT	600 metres or 12 minutes	Communications May need Refill Station or Vehicle
	5 Team IN & 5 Team OUT	Over 600 metres with a limit of 40 minutes	
BG4	5 Team IN & 5 Team OUT	Beyond only = RISK ASSESSMENT	

