REVIEW OF MINES RESCUE SERVICE

"Managing the Risk"

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"Managing the Risk" in Australian Coal Industry could well be the story of The Mines Rescue Service.

The Queensland Mines Rescue Service was born out of the risks encountered in the Underground coal Industry.

Mines Rescue was created out of the smoke, death and dust of the West Moreton Coalfield known originally as the 'MINES RESCUE BRIGADE" 1910-1923.

In 1923 Mines Rescue was officially recognised and the first Mines Rescue Station in Australia was built at Booval near Ipswich.

From the inception of the first station in 1923 Mines Rescue has developed and expand in both NSW and Queensland and to a lesser extent in other states.

In Queensland Mines Rescue is Incorporated in the Coal Mining Act, Section 76 under the auspices of the Minister for Minerals and Energy.

The management structure is as indicated:

1. Minister
2. Management Committee
    - Participants of the Committee:
        - DME - Chief Inspector of Coal Mines
        - Coal Owners - Chairman of the Board
        - Workers Compensation Board
        - Mine Manager's
        - Members of the Mines Rescue Brigade
3. State Manager - responsible for the efficient running of the QMRB under the auspices of the Committee.
4. Mines Rescue Staff Structure
    - Superintendents and Assistant Superintendents - responsible for mine rescue training and preparedness in their area

    Stations are located as shown:
    - Collinsville
    - Dysart
    - Blackwater
    - Moura
    - Booval

    TOTAL TRAINEES = 250

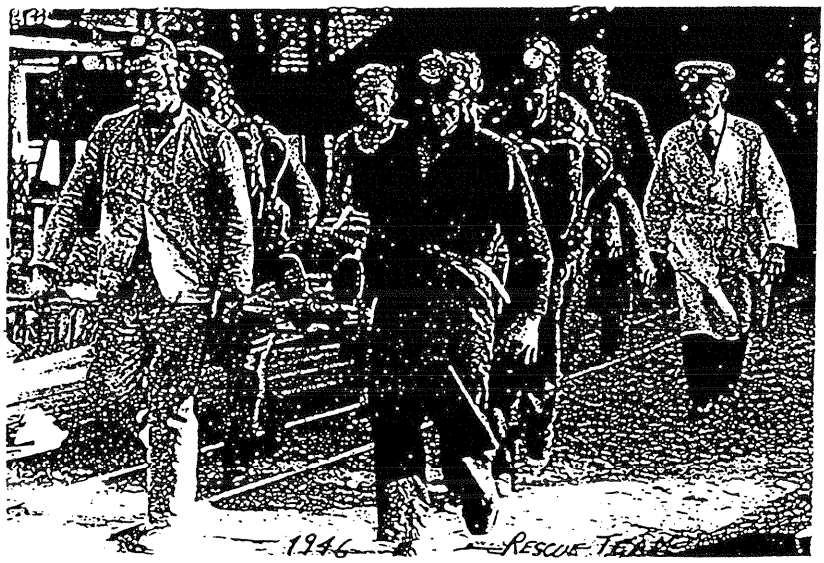
Funding of Mines Rescue is a tripartite arrangement incorporating the Coal Industry of Queensland, the Department of Mines and Energy, The Queensland Workers Compensation Board.

Plans are presently underway to change from the QMRB to the QMR Service which will be a separate legal entity within the state with an expanded role in Rescue, Safety and Training.

2. TODAY MINES RESCUE STANDS AT THE CROSSROADS

For too long Mines Rescue has been forgotten by the stakeholders in Industry and Government.

Whilst mining and technology have moved on significantly in our industry the same cannot be said for Mines Rescue.



Coal Mining has changed significantly over the last 50 years:

- From hand mining with horses and one tonne skips
- To modern highly mechanised mines
- Board and Pillar mining and extraction with breaker line supports
- Modern high technology longwall mines with major belt conveyor installations and gas drainage facilities with full mine monitoring

The modern mines of the 1990's and beyond will probably incorporate the following safety systems:

- Oxygen Self Rescuers
- Mine Refuge chambers
- Purpose designed portals with air locks

Mines Rescue today has changed very little over the last 50 years:

- We have improved communication systems
- The Drager BG174 has replaced the old Proto suit
- Improved gas measurement instrumentation

But we still continue in a very manual manner much the same as we did in the 1940's. This picture readily reminds us of today's Mines Rescue teams. An indication of this is clearly shown in the planned re-entry of Moura. Traditionally this would have taken 11 staged entries and a possible 3 months - hardly acceptable in today's world without good reason.

We are about "Managing the Risk"

Which begs the Question - Well what is Required.

3A. FIRSTLY WHAT CAN BE DONE AT MINES TO MINIMIZE A DISASTER OCCURRING?

- A high standard of mine monitoring
- Well rehearsed Emergency procedures and hazard analysis
- High standards of stonedusting
- Good mine ventilation practices
- Use of flameproof or intrinsically safe electrical equipment
- Well trained personnel
- Review and trials of emergency procedures

3B. SECONDLY WHAT CAN MINES RESCUE DO AFTER SUCH AN INCIDENT HAS OCCURRED?

- Presently Mines Rescue can do very little in the mine until mine atmospheres are under control and hence the potential for further explosions is negated.
- This is presently done by sealing of the mine or section involved.
- Once atmospheric control is obtained which at times may take days or weeks.
- Mines Rescue is the only trained resource of skilled personnel capable of working in inhospitable or toxic mine atmospheres.
- Presently all Rescue work is conducted on foot as was done at the turn of the century. This is time consuming laborious and limited by the safe walk distance of the rescue suit and the atmospheric conditions.
- To re-enter an entire mine with our present Rescue procedure may take months due to re-ventilation procedures and the establishment of fresh air bases (FAB) in the mine.

3C. LOOKING TO THE FUTURE

With the possibility of mines having systems of secondary survival such as refuge chambers and oxygen self rescuers.

Mines Rescue must have a fast efficient recovery system to save lives and recover mines.

For such a system to be effective, we firstly must be able to control the mine environment under very specific controlled procedures.

4. HOW DO WE ACHIEVE THE ABOVE CRITERIA?

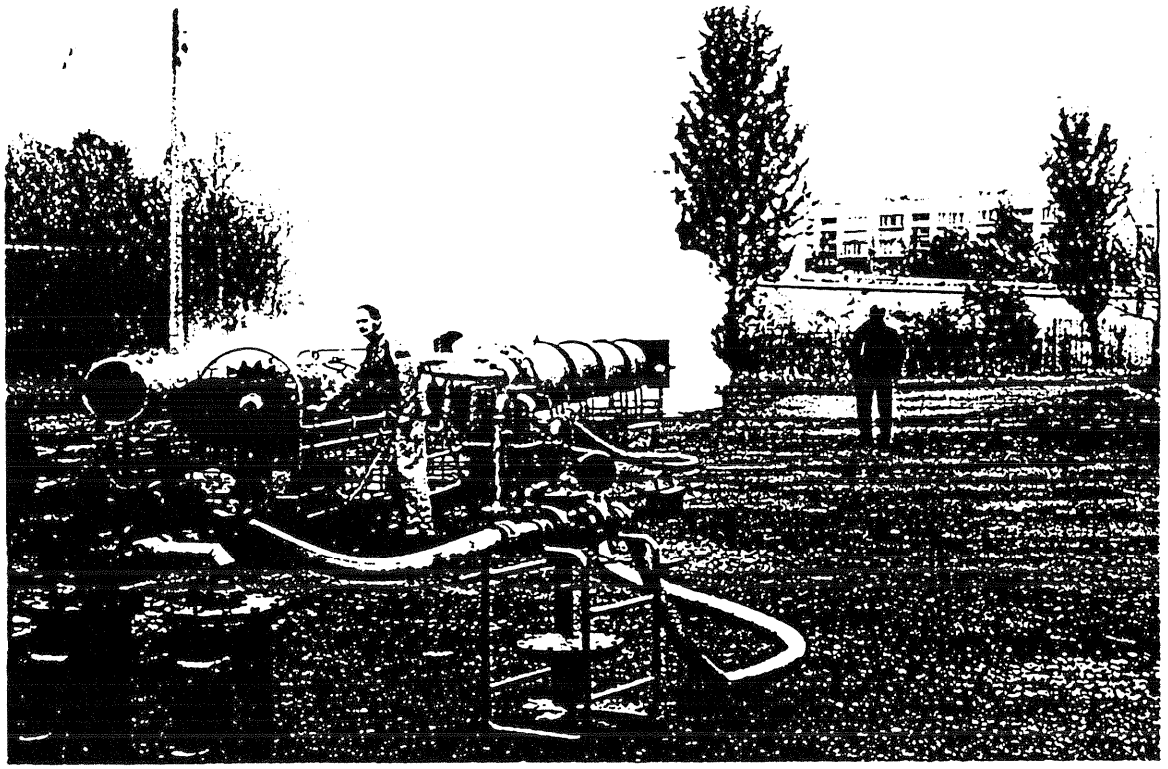
- Through very effective mine communication and monitoring systems including borehole monitors and cameras associated with explosion protected communication systems.
- We must have the ability to control mine fires and post explosion environments. The most successful tool to date is mine inertisation with equipment such as the Jet Engine (GAG-3A Poland)
- A mode of transport capable of entering the mine in irrespirable atmospheres with proper monitoring communication and recovery systems to allow recovery of mine workers from safe areas to the surface of the mine.

  Such a system may be battery powered with a protected chamber on equipment such as an LHD or scoop tram re specified to carry mine rescue personnel and extra rescue equipment.

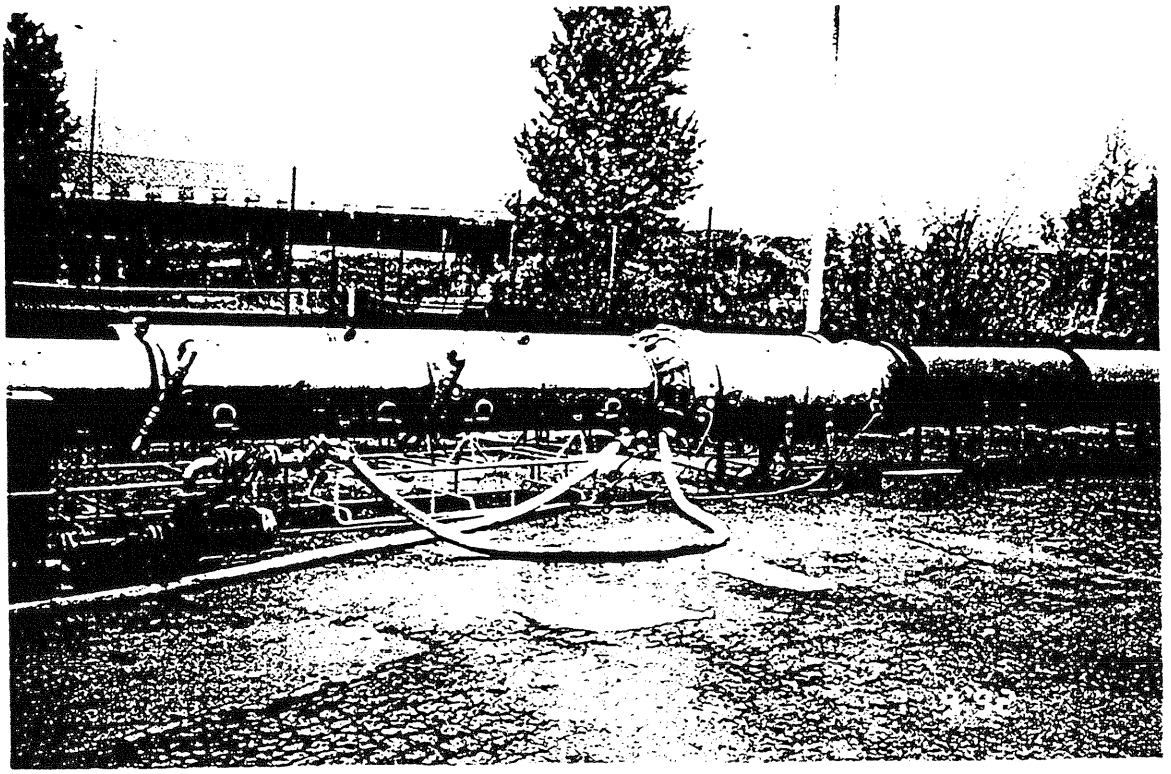
CONSIDERING A MINE SCENARIO

On this occasion we have a mine in a very dangerous state, fires and explosive mixtures of gases after an initial explosion. In such a case the risk is too great to send in Rescue Personnel unless inertisation is commenced to control the explosion risk. In addition we may have refuge chambers with known personnel alive.

INERT GAS GENERATOR



INERT GAS GENERATOR



AFTER BURNER SECTION SHOWING WATER JACKET AND EXTINGUISHING RING

PRO ACTIVE OUTCOMES (CONTROLS)

It is most important for mining in Queensland and Mines Rescue to be pro-active and attempt to control the outcome.

This can only be achieved by programmed rapid response and recovery.

The present system for recovery by Mines Rescue as currently available may not save lives due to time limitations.

To save lives we require a rapid response with controls to know we have achieved inertisation of the mine environment.

MINE INERTISATION

The GAG gas unit has extinguished a fire on a longwall face in 4 hours with O2 levels at 2%.

A fire in the Downcast Shaft pillar was extinguished in 2-3 hours with O2 below 12% in European Coal Mines.

Units have been purchased and trialed in South Africa and the United States for control of similar events.

Rapid Transport Recovery System

To enable the recovery of personnel and the saving of lives a rapid recovery system is essential once mine atmospheres are under control.

If recovery is beyond traditional mines rescue recovery a specialised transit transport vehicle is required to enter the mine, recover personnel and return to the surface.

To extend the capabilities of a rescue team the use of mechanical assistance in some form is required. e.g. the use of a special battery powered, LHD type vehicle, capable of inert atmosphere operation, should be considered or a suitable alternative.

The introduction of a specialised rescue vehicle for irrespirable atmosphere operations would be regarded as the most significant advancement to current Mines Rescue methodology.

Evaluation of the system may be considered under the following headings:

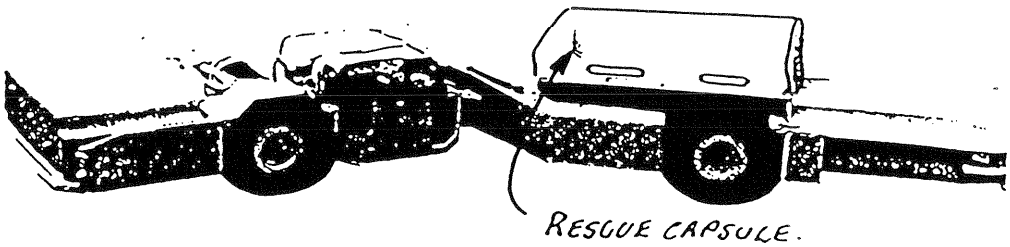
Perceived advantages

- Time saving
- Life saving
- Labour saving
- Reduced exposure
- Reduced risk
- Increased team travel
- Increased team capability

Team Requirements

- Safe operating procedures
- Personnel requirements
- On board equipment
- Surface to underground communications
- Back up recovery

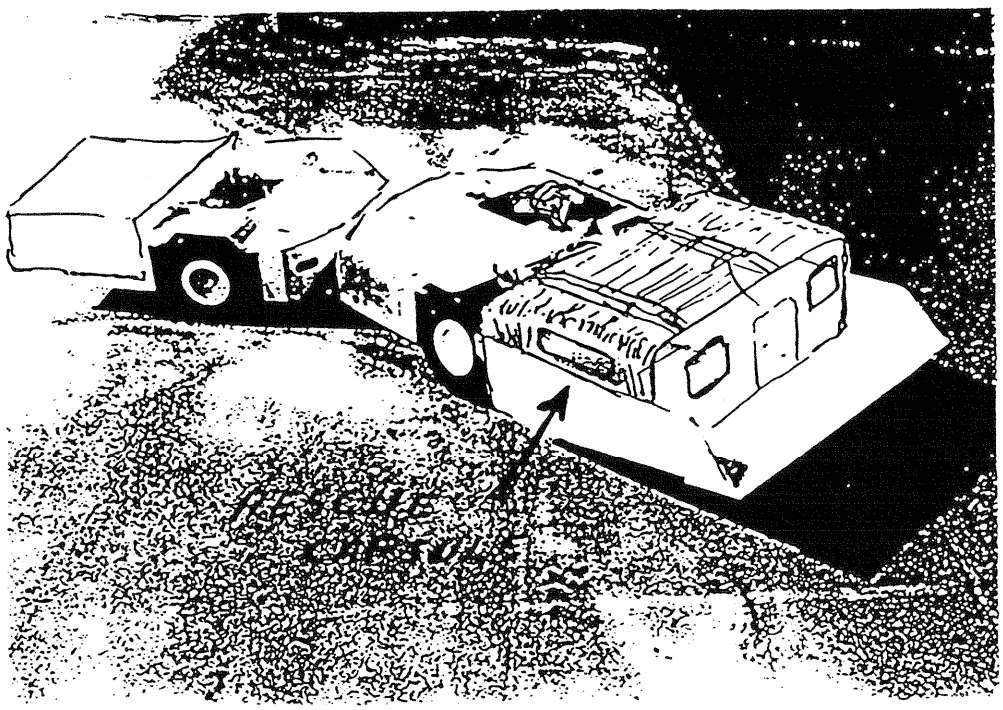
EMERGENCY RECOVERY VEHICLE



RESCUE CAPSULE.

A-Hauler Model	Center Section	Overall Length	Overall Width	Canopy		Inside Turning Radius	Outside Turning Radius	Wheel Base	Empty Weight Lbs	Capacity-Cl	
				Fully Lowered	Fully Raised					Struck	Heap
CH810A	Terrain Compensating	32'-9"	10'-6"	3'-3"	4'-7"	12'-3"	25'-1"	17'-2"	44,100	290	41
CH810B	Ball Bearing	32'-9"	10'-6"	3'-3"	4'-7"	12'-3"	25'-1"	17'-2"	44,100	290	41
CH818	Ball Bearing	34'-4"	10'-2"	5'-0"	5'-10"	12'-4"	24'-6"	16'-6"	55,800	447	60

RAPID TRANSIT VEHICLE. (PROPOSED)



Advantages

The vehicle would provide greatly enhanced exploration capability. To cater for very precise and specialised procedures, as well as considerably enhance operational achievement.

The advantage of such a system in recovery of personnel and sving of lives speaks for itself.

It would virtually eliminate the physical effort required from rescue teams in the areas of materials transport, debris removal, stopping site preparation and body recovery.

Reduce the number of ventilation stages to nil or only two or three from the eleven proposed for Moura and of 3 months duration.

Significantly reduce the overall irrespirable atmosphere operating time:

- reduction in teams travelling time/increase in real work time
- faster and greater volume of materials transport
- information gained by thorough exploration allows for an absolute minimum number of stoppings to be constructed
- reduced risk exposure time in rescue or recovery work

Time is the most significant benefactor as is risk and exposure.

Significant time saving from the present arrangement of weeks and months in Moura to shifts and days under the new system.

To ensure the saving of lives, we must develop such a system that allows rapid, controlled access to entrapped personnel.

The time factor is now most important once atmospheric controls are in place and monitored.

The recovery of entrapped miners must be achievable in shifts, days or weeks at the extreme. This can only be achieved by a specialised rescue recovery vehicle along the lines of that proposed.

Looking beyond this exercise, with the possible introduction of underground refuge chambers into the industry, battery powered vehicles must be an integral enhancing and necessary component of that survival system for ensuring the saving of lives in mines.

6. SUMMARY OF REQUIREMENT FOR ACCESS VEHICLE:

a. Battery powered or an alternative independent power system
b. Robust construction with good visibility and lighting front and rear
c. Adjustable height preferred below 1.5 metres
d. Ability to clear roadways (bucket loading arrangement)
e. Capable of carrying rescue team and survivors (10-16 men)
f. Safety equipment and rescue items
g. Independent air supply or capsules on board
h. Surface to underground communications system utilising TV cameras, night vision and infra red systems
i. Provision for seeing through dust and haze (radar type device)
j. On board monitoring and provision for sampling of mine atmospheres

CONCLUSIONS:

The use of a battery powered vehicle would provide significant advantages for recovery operations at mines where men are entrapped.

Comprehensive prior training would be necessary to gain confidence and acceptance, associated with safe operating procedures and protocol.

The GAG system of mine gas inertisation must be available and utilised in conjunction with the mine recovery vehicle for rapid recovery of entrapped personnel.

Proper monitoring via boreholes utilising cameras and gas monitors would be an essential part of this system, or the use of "Numbat" type monitoring units to ensure access and environmental controls.

7. IN SUMMARY:

It is patently evident that Mines Rescue must update and maintain its standards which are compatible with today's modern and viable coal Industry.

Coal is the number one export earner for Australia and Queensland and Mining requires and expects the services of an efficient Mines Rescue Service.

To maintain the technological advantage that we have, Mines Rescue in the Queensland Coal Industry must have an efficient and effective Mines Rescue Package.

This is best summarised as follows:

VIEWS TOWARDS THE FUTURE

EMERGENCY SAFETY - NEEDS PRECAUTIONS

MINES

- OXYGEN SELF RESCUERS
- EFFECTIVE ROBUST MINE MONITORING SYSTEM
- PERSONNEL LOCATION MONITORS
- MINE REFUGE CHAMBERS
- RECOVERY AIR LOCKS (MACHINE TRAFFICABLE)

MINES RESCUE

- GAS MONITORING SUPPORT (SEGAS SMARTGAS)
- REMOTE VEHICLE ACCESS MONITORING
- MINE INERTISATION SYSTEM (JET ENGINE)
- RAPID TRANSIT RESCUE/RECOVERY VEHICLE
- COMMUNICATION - SURFACE TO VEHICLE
- INCREASED VISION (RADAR INFRA RED)
- BOREHOLE ANALYSIS AND CAMERA SYSTEMS

AFTER MOURA AND THE WARDENS REPORT THE DIRECTIVES ARE CLEAR:

- *ACTION IS NECESSARY AND SYSTEMS ARE AVAILABLE.*
- *WE MUST NOT HAVE ANOTHER ICE AGE WHERE ACTIONS ARE TO SAY THE LEAST "GLACIAL".*
- *GENTLEMAN, THE FUTURE OF MINES RESCUE IS IN YOUR HANDS,*
- *IT IS PART OF YOUR INDUSTRY AND MINING OPERATION.*

"MANAGING THE RISK" IS WHAT MINES RESCUE IS ABOUT.