



mine emergencies and response

Introduction

The terms emergency and disaster are often used interchangeably, but it is helpful to distinguish them. The Macquarie Dictionary provides the following useful definitions :

disaster - any unfortunate event, especially a sudden or great misfortune

emergency - an unforeseen occurrence, a sudden and urgent occasion for action

Clearly, the effectiveness of the action ie the response to an emergency, will determine whether or not it becomes a disaster. Because of the sudden and often unforeseen nature of emergencies, the ability to respond effectively depends largely on planning and preparation. It is now common (and often a statutory requirement) for mines to have a comprehensive Emergency Response Plan that details the procedures to be followed in the case of a wide range of potential emergency situations.

Due to its very nature, mining is a dangerous activity. The workplace is a temporary intrusion into a highly variable, natural material, often on a scale that creates or disturbs very powerful forces. The history of mining is littered with major tragedies involving the loss of hundreds of lives. Australia has been fortunate, with very few major disasters. Only two have claimed more than thirty lives : a shaft fire at Mt Lyell in 1912 and a coal dust explosion at Mt Mulligan in 1921.

Most mine emergencies are due to one or more of the following :

- Fire
- Explosion
- Inundation
- Collapse of ground

Underground mines have a greater risk due to their confined workplaces, limited means of access and egress and the potential for an irrespirable atmosphere.

Groups of mine personnel trained to respond in an emergency are referred to as Emergency Service Teams. When their training includes the use of long duration, self- contained breathing apparatus; they are called Mine Rescue Teams. Open pit mines usually have Emergency Service Teams whereas underground mines should have Mine Rescue Teams.



Role of Mine Rescue

The primary role of a mine rescue team comprises three duties in order of importance :

1. Locating and rescuing trapped persons (SAVE LIVES)
2. Locating and controlling fires (FIGHT FIRES)
3. Recovering mine workings after a fire or explosion (TEST FOR GASES)

Other tasks requiring the use of breathing apparatus may be undertaken eg inspection of old workings.



Breathing Apparatus

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There are various types of breathing apparatus designed for different purposes. It is important to understand the capabilities and limitations of each.

Self Rescuers

These are small units usually carried by all underground personnel, or strategically located for use in an emergency. The older types only provide limited protection against carbon monoxide by converting it to carbon dioxide. The reaction is exothermic and the inhaled air may become very hot. Modern units provide a supply of clean oxygen for 30-60 minutes from a small, high pressure bottle or by a controlled chemical reaction. These units provide complete protection from all gases for their specified duration. They are becoming mandatory in many mines.

Open Circuit Units

This type of apparatus has a large cylinder of compressed air, similar to a scuba diving tank. The air is only inhaled once and then expired directly to the atmosphere. Such units will only last 30-40 minutes under conditions of moderate to heavy work and are not suitable as primary breathing apparatus for mine rescue teams. They may be used as reserve units for use by trapped personnel, although they are quite bulky. They are suitable for surface rescue from buildings and very shallow workings and are widely used by the fire services.

Closed Circuit Units

These units use a source of pure oxygen, either compressed or liquid. Once expired, the carbon dioxide is removed chemically and the remaining oxygen is topped up with fresh oxygen from the source and reused. Most such units will last from 2-4 hours under heavy work conditions and up to 12 hours if the wearer is at rest. They are the primary breathing apparatus for mine rescue teams. Miniature versions with durations of 30-60 minutes are suitable as reserve units for trapped personnel. Comprehensive testing is required before wearing to ensure the apparatus is functioning properly.



Rescue Equipment

Other equipment typically carried by a team includes :

- Gas detection instruments
- Fire fighting apparatus
- First aid kit, resuscitator, stretcher
- Communications (field telephone, personal signal devices)
- Inflatable stopping
- Link lines, ropes, axes, spotlight, paint cans etc.



Fresh Air Base (FAB)

Rescue operations commence when the team goes "under oxygen" at the FAB. This is the nearest point to the emergency with an assured supply of respirable air and a secure means of egress to the surface in respirable air. Adequate space, illumination and communications with the surface are also desirable. The team should maintain contact with FAB throughout their operation and a back-up team should be on standby.



Rescue Team Procedures

A team usually comprises 5 or 6 members although a minimum of 4 may be used. The safety of team members is always top priority. If any member of a team gets into difficulty, the entire team must

return to the FAB. A team should allow at least twice as long for the return journey as for the trip in. Travelling speed in good conditions is typically 50 metres per minute, but would be much slower in adverse conditions. A life line should be laid, linking the team to the FAB. This is usually the field telephone line, but light rope may be used. Each person carries a 1.2 metre quick release link line to connect team members together in thick smoke. The route of travel must be clearly marked to show which areas have been searched and to provide a marked way out.

Hooters or small electronic signalling devices are used for communication between team members. A typical code of signals could be :

- 1 beep - emergency/danger/help
- 2 beeps - stop
- 3 beeps - retreat/go back
- 4 beeps - advance/move forward
- 5 beeps - pay attention/listen

Similar signals can be given using cap lamps if visibility is good and there is excessive noise.



Team Training

A high level of fitness and proficiency is essential for active team members. Regular training of at least 4 hours per month including one hour "under oxygen" is required. Each team member must be familiar with every item of equipment and be able to strip, clean, assemble and test them under emergency conditions. Because real emergencies will be very infrequent, competitions are essential to maintain standards, interest and morale. These should be as realistic as possible with competent judges. Visiting teams ensure a transfer of new ideas and best practices.



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