

MINE HEALTH AND SAFETY INSPECTORATE



GUIDELINE

For the Compilation of a Mandatory Code of Practice for Emergency Preparedness and Response



mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

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Practice for Emergency Preparedness and Response



Chief Inspector of Mines

31 January 2011

Date



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PART A: THE GUIDELINE

1 FOREWORD

- 1.1 The risk associated with work in the mining industry has seen major incidents, ranging from the relatively minor to the infrequent, low probability but potentially catastrophic events that could lead to a major disaster if **emergency** preparedness and response measure are not in place.
- 1.2 The aim of this guideline is to provide a framework to assist the employer, of every mine to prepare a Code of Practice (**COP**) on **emergency** preparedness and response measures in order to reduce and control the significant risks associated with emergencies.

2 LEGAL STATUS OF GUIDELINES AND COPS

- 2.1 In accordance with section 9(2) of the **MHSA** an employer must prepare and implement a **COP** on any matter affecting the health and safety of employees and other persons who may be directly affected by activities at the mine if the Chief Inspector of Mines requires it. These **COPs** must comply with any relevant guidelines issued by the Chief Inspector of Mines (section 9(3)) of the **MHSA**. Failure by the employer to prepare or implement a **COP** in compliance with this guideline is breach of the **MHSA**.

3 OBJECTIVE OF THE GUIDELINE

- 3.1 The objective of this guideline is to enable the employer at every mine to compile a **COP**, which, if properly implemented and complied with, would improve **emergency** preparedness and response at the mine, thereby minimising risks to persons affected by emergencies.
- 3.2 It provides guidance of a general nature on the required format and content for the **COP** and details sufficient technical background to enable a drafting committee at the mine to prepare a comprehensive and practical **COP** for their mine.

4 DEFINITIONS AND ACRONYMS

In this guideline for a **COP** or any amendment thereof, unless the context otherwise indicates: -

COP means Code of Practice;

Emergency means a situation, event or set of circumstances at a mine that could threaten the health or safety of persons at or off the mine, and which requires immediate remedial action, such as the evacuation, rescue or recovery of persons, to prevent serious injury or harm, or further serious injury or harm, to persons;

DMR means the Department of Mineral Resources;

MHSA means Mine Health and Safety Act, 1996 (Act No. 29 of 1996);

PLACE OF SAFETY means any place, which, despite an **emergency**, can sustain life for the duration of the **emergency** and is adequate in size to accommodate the maximum number of affected persons likely to be present in the area served by it.

(Such place could include, provided it remains safe despite an emergency, the following:

- an intake airway commencing from the surface of the mine, which contains no combustible material or in which all combustible material has been rendered fire-resistant and in which no combustible material in quantities sufficient to endanger or likely to endanger the safety of somebody is conveyed during the working shift; or
- a selected place in the underground workings where additional self rescuing devices (e.g. cache system) are stored ready for use, sufficient in number to provide for the number of persons likely to make use of such devices, and of adequate duration to reach any other **PLACE OF SAFETY**; or
- a refuge bay as contemplated in Annex I, which is attached (for information purposes only).

5 SCOPE

5.1 It is generally accepted that **emergency** management should be carried out with reference to a four-element **emergency** management model, which consists of:

- *Prevention*: Encompasses all those activities designed to prevent emergencies from occurring, or to mitigate the effects on the mine and/or community.
- *Preparedness*: Includes those activities concerned with preparing the mine and/or community for emergencies.
- *Response*: Includes all **emergency** response activities following the impact of an **emergency** (including those actions taken immediately prior to impact for an event that has some warning).
- *Recovery*: All activities intended to return the mine and/or community to normal after the impact of an **emergency**.

5.2 It must be recognised that the elements are not exclusive and that possible overlap exists, particularly between the Prevention and Preparedness elements and between the Response and Recovery elements.

5.3 The scope of this guideline relates to measures or procedures that are established to prepare for, respond to and recover from the impact of emergencies and do not address any **emergency** prevention aspects.

5.4 This guideline focuses exclusively on the management of **emergency** preparedness, response and recovery, and therefore should not be the only document used when drafting the **COP**, as other guidelines and/or outside/external publications may also have to be considered, e.g. SIMRAC Research Reports, Chamber of Mines of South Africa, CSIR, South African Bureau of Standards, etc.

5.5 This guideline addresses issues relating to hazard identification and risk assessment, detection and early warning systems, communication systems, first aid equipment and facilities, mine evacuation and escape strategy, rescue capabilities, management of emergencies and education and training pertaining to a **COP**.

6 MEMBERS OF THE TASK GROUP

The initial task team was made up of the following:

STATE	EMPLOYEES	EMPLOYERS
W.J. Fourie (Chairperson)	J. Henning	D.J. van Niekerk
B.A. Doyle	S.F. Stehring	C. Vreugdenburg
J.J. Beukes		W.A. Retief
R.H. McIntyre (Alternate)		J.P. Visser
		L. Naude

The final task team was made up of the following:

STATE	EMPLOYEES	EMPLOYERS
W.J. Fourie (Chairperson)	S.F. Stehring	C. Vreugdenburg
B.A. Doyle		M. Karsten
J.J. Beukes		

The following persons/organisations formed part of the task team:

C. de Klerk	Mines Rescue Services (Pty) Ltd
J.W. Johnson	Mines Rescue Services (Pty) Ltd

PART B: AUTHOR'S GUIDE

1. The **COP** must, where possible, follow the sequence laid out in Part C "Format and Content of the **COP**". The pages as well as the chapters and sections must be numbered to facilitate cross-referencing. Wording must be unambiguous and concise.
2. It should be indicated in the COP and on each annex to the COP whether-
 - 2.1 the annex forms part of the **COP** and must be complied with or incorporated in the **COP** or whether aspects thereof must be complied with or incorporated in the **COP**; or
 - 2.2 the annex is merely attached as information for consideration in the preparation of the **COP** (i.e. compliance is discretionary).
3. When annexes are used the numbering should be preceded by the letter allocated to that particular annex and the numbering should start at one (1) again. (e.g. 1, 2, 3, ...A1, A2, A3,).
4. Whenever possible illustrations, tables, graphs and the like, should be used to avoid long descriptions and/or explanations.
5. When reference has been made in the text to publications or reports, references to these sources must be included in the text as footnotes or side notes as well as in a separate bibliography.

PART C: FORMAT AND CONTENT OF THE MANDATORY COP

1 TITLE PAGE

The **COP** should have a title page reflecting at least the following -

- 1.1 The name of mine;
- 1.2 The heading: "Mandatory Code of Practice on **Emergency** Preparedness and Response";
- 1.3 A statement to the effect that the **COP** was drawn up in accordance with Guideline DMR Reference Number DMR 16/3/2/1-A5 issued by the Chief Inspector of Mines;
- 1.4 The mine reference number for the **COP**;
- 1.5 The effective date; and
- 1.6 Revision dates (if applicable).

2 TABLE OF CONTENTS

The **COP** must have a comprehensive table of contents.

3 STATUS OF MANDATORY COP

This section must contain statements to the effect that:

- 3.1 The **COP** was drawn up in accordance with Guideline Reference Number DMR 16/3/2/1-A5 issued by the Chief Inspector of Mines.
- 3.2 This is a mandatory **COP** in terms of section 9(2) and (3) of the **MHSA**;
- 3.3 The **COP** may be used in an accident investigation/inquiry to ascertain compliance and also to establish whether the **COP** is effective and fit for purpose;
- 3.4 The **COP** supersedes all previous relevant **COPs**; and
- 3.5 All managerial instructions, recommended procedures (voluntary **COPs**) and standards on the relevant topics must comply with the **COP** and must be reviewed to ensure compliance.

4 MEMBERS OF DRAFTING COMMITTEE

- 4.1 In terms of section 9(4) of the **MHSA** the employer must consult with the health and safety committee on the preparation, implementation or revision of any **COP**.
- 4.2 It is recommended that the employer should, after consultation with the employees in terms of

the **MHSA**, appoint a committee responsible for the drafting of the **COP**.

- 4.3 The members of the drafting committee assisting the employer in drafting the **COP** should be listed giving their full names, designations, affiliations and experience. This committee must include competent persons sufficient in number effectively to draft the **COP**.

5 GENERAL INFORMATION

General relevant information relating to the mine must be stated in this section of the **COP**.

The following minimum information must be provided:

- 5.1 A brief description of the mine and its location;
- 5.2 The commodities produced;
- 5.3 The mining methods or combination of methods used at the mine must be listed. This section must discuss the degree of mechanisation, taking care to identify the potential situation and or sources that could give rise to an **emergency**.
- 5.4 The unique features of the mine that have a bearing on this **COP** must be set out and cross-referenced to the risk assessment conducted.

6 TERMS AND DEFINITIONS

Any word, phrase or term of which the meaning is not absolutely clear or which will have a specific meaning assigned to it in the **COP**, must be clearly defined. Existing and/or known definitions should be used as far as possible. The drafting committee should avoid jargon and abbreviations that are not in common use or that have not been defined. The definitions section should also include acronyms and technical terms used.

7 RISK MANAGEMENT

- 7.1 Section 11 of the **MHSA** requires the employer to identify hazards, assess the health and safety risks to which employees may be exposed while they are at work, and record the significant hazards identified and risk assessed. The employer must determine how the significant risks identified in the risk assessment process must be dealt with, having regard to the requirement of section 11(2) and (3) that, as far as reasonably practicable, attempts should first be made to eliminate the risk, thereafter to control the risk at source, thereafter to minimise the risk and thereafter, insofar as the risk remains, to provide personal protective equipment and to institute a programme to monitor the risk.
- 7.2 To assist the employer with the risk assessment all possible relevant information such as accident statistics, locality of mine and emergency services, ergonomic studies, research

reports, manufacturers' specifications, approvals, design criteria and performance figures for all relevant equipment, should be obtained and/or considered.

- 7.3 In addition to the periodic review required by section 11(4) of the **MHSA**, the **COP** should be reviewed and updated after every **emergency**, altered circumstances, or if significant changes are introduced to procedures, mining and ventilation layouts, mining methods, plant or equipment and material.

8 ASPECTS TO BE ADDRESSED IN THE COP

The **COP** must set out how the significant risks, identified and assessed in terms of the risk assessment process referred to in paragraph 7.1, will be addressed. The **COP** must cover at least the aspects set out below, unless there is no significant risk associated with that aspect in relation to emergencies at the mine:

8.1. Emergency Preparedness Measures

8.1.1 Detection and early warning systems

In order to ensure that emergencies are detected as early as practicably possible and persons are warned timeously of such **emergency**, the **COP** must cover at least the following:

- Types and position of fixed detectors/early warning systems (localised alarms, stench gas, etc.) for the timeous detection and early warning of all identified possible emergencies e.g., fires, flooding/mud rushes, seismicity, gases, chemical/toxic/biological releases, lightning, power failures, etc.;
- Types and quantity, including back-up units, of personalised detectors/early warning systems e.g. flammable gas measuring instruments, flammable gas warning devices, Carbon Monoxide detectors, pagers, radios, etc;
- Detailed procedures for personal issue of detectors/early warning systems (recommend that the lamproom guidance note issued by the Chief Inspector of Mines be consulted, OH-11-2003 dated 30-06-2003);
- Procedures to ensure that actual settings of alarm levels remain effective; and
- Frequencies of maintenance, calibration and testing procedures.

8.1.2 Communication systems

In order to ensure that appropriate communication systems are in place to deal with an **emergency** the **COP** must cover at least the following:

- Type and position of a system for communication at the mine to enable effective communication to deal with an **emergency**, including arrangements for a back-up system;
- Arrangements for communications from the mine to outside parties; and
- The testing of the effectiveness of the communication systems on a frequent basis.

8.1.3 **Emergency medical care**

In order to ensure that appropriate **emergency** medical care and facilities are readily available to deal with any **emergency** the **COP** must cover at least the following:

- Arrangements for the provision of **emergency** medical care, including the locality of facilities, provision of suitably trained medical persons, response times, capabilities to treat and evacuate multiple injured persons, etc.; and
- Availability, locality, quantity and variety of **emergency** medical equipment.

8.1.4 **Mine evacuation and escape procedures**

In order to ensure the safe evacuation and escape of affected persons to a **place of safety** in the event of an **emergency**, the **COP** must cover the following:

- Procedures for the escape and/or rescue of persons from e.g. single and multiple entry working places, surface working places, confined spaces, elevated places, etc.; and
- Provision of **places of safety**, including the locality, quantity, distance in relation to working places and the provision of life sustaining facilities, such as food, potable water, breathable air, etc. (When body-worn Self-Contained Self-Rescuers are issued it is recommend that the document issued by the Chamber of Mines Research Organization (COMRO) '*ResQpacs; How to calculate safe travelling distances*', be consulted.).

8.1.5 **Training and awareness**

In order to ensure that all potentially affected persons are educated, trained and made aware on how to deal with emergencies, the **COP** must cover at least the following:

- The content and frequency of such training (see also section 10(2)(d) of **MHSA**);
- The procedures and appropriate actions to be taken in the event of an **emergency**, including simulated exercises;
- The correct procedures and applications on the use of **emergency** equipment;

- The actions required relating to the location and description of shutdown controls/lock out devices;
- Instructions in the use of belt-worn self-contained self-rescuers; and
- The locality of copies of the **emergency** procedures and instructions.

8.2. Emergency Response Measures

8.2.1 Rescue and response capabilities

In order to ensure that emergencies are reacted to timeously with adequate rescue and response capabilities the **COP** must detail and describe at least the following:

- The requirement, necessity and access to rescue and response capabilities, e.g. number of rescue personnel, arrangement for mobilisation, variety and access to specialised rescue equipment, remoteness of the mine, response times, etc;
- The arrangements with a mines rescue service provider, as contemplated in regulation 16.5.(1)(c) and/or with any other rescue service provider; and
- Additional instrumentation and equipment available to maintain rescue brigades, e.g. a means to detect carbon monoxide, carbon dioxide, flammable gas and oxygen, ancillary rescue equipment, etc.

8.2.2 Management of emergencies

In order to ensure that emergencies can be managed and dealt with effectively the **COP** must cover at least the following:

- Procedures for the updating of emergency manuals, contacts of neighbouring mines, contacts of emergency services, internal and external telephone directory;
- Establishment of **emergency** control centre/s including locality, size, equipment required, plans, communication, etc. (refer to Annex II);
- The duties and responsibilities of persons required during an **emergency** (refer to Annex III); and
- Procedures to deal with adverse environmental conditions, which could be encountered during an **emergency**, e.g. flooding, gases, heat, etc.

8.3. Reporting and Recording

In order to ensure that the **emergency** preparedness and response measures and procedures remain effective, the **COP** must cover at least the following:

- The procedure for the inspection, testing and maintenance of all equipment and facilities that may be used in an **emergency** at appropriate intervals, and by persons designated by the employer for this purpose; and
- The reporting, recording and archiving system, at appropriate intervals of those measures and procedures and the person/s responsible.

8.4. Emergency Aspects Addressed In Other Mandatory COPs

When an **emergency** aspect is addressed in any other **COP** it must be cross-referenced under this section.

PART D: IMPLEMENTATION

1. IMPLEMENTATION PLAN

- 1.1 The employer must prepare an implementation plan for its **COP** that makes provision for issues such as organisational structures, responsibilities of functionaries and programmes and schedules for the **COP** that will enable proper implementation of the **COP**. (A summary of and a reference to, a comprehensive implementation plan may be included).
- 1.2 Information may be graphically represented to facilitate easy interpretation of the data and to highlight trends for the purposes of risk assessment.

2. COMPLIANCE WITH THE COP

The employer must institute measures for monitoring and ensuring compliance with the **COP**.

3. ACCESS TO THE COP AND RELATED DOCUMENTS

- 3.1 The employer must ensure that a complete **COP** and related documents are kept readily available at the mine for examination by any affected person (describe the process).
- 3.2 A registered trade union with members at the mine or where there is no such union, a health and safety representative on the mine, or, if there is no health and safety representative, an employee representing the employees on the mine, must be provided with a copy on written request to the manager. A register must be kept of such persons or institutions with copies to facilitate updating of such copies.
- 3.3 The employer must ensure that all employees are fully conversant with those sections of the **COP** relevant to their respective areas of responsibilities.

ANNEX I - REFUGE BAYS

(For information purposes only)

1. OBJECTIVE

To provide a general framework for the siting, construction, equipping and maintenance of refuge bays.

2. SITING/LOCATION

The position of a refuge bay should be determined by the employer. Refuge bays are to be positioned in areas free of combustible material or combustible material rendered inert, within an appropriate distance from the working places. Further due consideration must be given to factors such as:

- The travelling conditions from the workplace e.g. height, walking surface, gradient, possible disorientation, etc.
- The duration of the self-contained self-rescuers used on the mine.

3. CONSTRUCTION/DESIGN

- 3.1 Refuge bays should be of robust construction and where there is a significant risk of explosions it must be able to withstand the effects of such an explosion.
- 3.2 The size of the refuge bay should be determined by the maximum number of persons likely to be present in the area served by the refuge bay, with a minimum floor area of 0.6 m² per person.
- 3.3 Life-sustaining services installed to the refuge bay should be of fire resistant material or else be fire protected.
- 3.4 A refuge bay must be air tight and sealed in such a way so as to ensure a positive pressure that will make the refuge bay inaccessible to air containing noxious smoke, fumes or gases.
- 3.5 Access arrangements into the refuge bay should be such that it does not negatively affect the integrity or size of the refuge bay.
- 3.6 Refuge bays should be provided with a man door, and where there is a significant risk of an explosion, a flexible type of door that would not be rendered ineffective in the event of an explosion should be considered.
- 3.7 Refuge bays should be provided with seating arrangements where practicable.
- 3.8 Where applicable, such as at collieries, a surface borehole system, for the provisioning of

respirable air to the refuge bay, may be provided. Access requirements for equipment and vehicles to the borehole site must be taken into account.

- 3.9 An identification system of refuge bays must be implemented and must be clearly indicated on the inside and on the outside of the refuge bay. Where a surface borehole system is used such corresponding identification must also be indicated at the borehole site on surface. This corresponding identification must be indicated on the Mine Rescue Plan contemplated in regulation 17(19).
- 3.10 Where the life-sustainability of a refuge bay is dependent on compressed air, the supply to the inside of the refuge bay should be tamper-free, with a control valve on the inside of the refuge bay.

4. EQUIPMENT/FACILITIES

All refuge bays should have-

- 4.1 A supply of potable water (a minimum of 2 litres per person for 24 hours is recommended).
- 4.2 An effective communication system to surface, with operating instructions. The appropriate emergency contact details must be displayed.
- 4.3 A clearly visible reflective type "Refuge Bay" symbolic sign should be displayed at the entrance to the refuge bay.
- 4.4 A conspicuous light with a reliable independent power supply, or any other physical means placed in such a position in the travelling way so as to indicate the location of the refuge bay.
- 4.5 An audible device positioned outside the refuge bay that can be activated from the inside.
- 4.6 Toilet facilities.
- 4.7 First aid equipment.
- 4.8 Flushing and pressurization tests must be conducted on all refuge bays before being commissioned and at appropriate intervals.
- 4.9 A notice board inside the bay, displaying the correct procedure to be followed during occupation in an emergency, for example:
- Activate the ventilation arrangements.
 - Activate the audible device.
 - The most senior person to take charge of the operations and to contact the attendant at the surface control room or any other senior official on the mine.

- Take roll call.
- Remain calm and do not move around unnecessarily.
- Conserve lights. Keep only enough caplamps on at any one time to provide sufficient illumination.
- Persons to remain in the refuge bay until otherwise instructed by the official in charge at the control centre, or rescued.
- Keep the door closed during occupation.

5. VENTILATION ARRANGEMENTS

The refuge bay must be provided with a reliable supply of respirable air so as to ensure proper flushing and to create a positive pressure. Where compressed air is used an arrangement for silencing must be provided.

6. ESCAPE ROUTES

Escape routes to refuge bays and alternative fresh air routes must be clearly indicated with any physical means e.g. standard symbolic signs, directional cone escape rope, life line, etc., and should be kept free of any obstructions.

ANNEX II - EMERGENCY CONTROL CENTRE; STRUCTURE AND PROCEDURE

(For information purposes only)

1. Forward

A well-designed and efficient control centre is the key to success in controlling an emergency operation.

The control centre is the nerve centre during a crisis where information is gathered and analysed. From this analysis, a strategy emerges for translation into action plans.

The execution of planned action by clear and comprehensive briefing of rescue teams and personnel will greatly enhance operational efficiency and limit loss.

Spontaneous "off the cuff" decision making leads to poor and often contradicting instructions, with the result that confusion and poor worker motivation and performance occur.

2. The Emergency Control Centre

Objectives

To ensure an orderly and efficient transition from routine operations to effective mine emergency response.

Supportive objectives:

- Gathering and analysing information.
- Effective communication between various components.
- Planning strategy
- Briefing and instructing of operational staff and rescue teams.
- Co-ordinating planned action.
- Direct operation.
- Involve all key personnel.
- Record keeping.
- Ensure safety of operational personnel.
- Limit loss through effective management of the emergency.
- Initial re-organisation of mining operations.

3. PHYSICAL FEATURES AND EQUIPMENT OF A CONTROL ROOM

3.1 Size

There is no prescribed minimum size of a control room. However it is advantageous to separate the control room from the rescue team briefing room. The briefing room could also house the Gas Chromatograph, radios, batteries and battery chargers as well as the mine ventilation and rescue plan and location plan. The mines rescue service provider representative should have a separate office with outside communication facilities.

A dimension of 35m² is adequate. A large room encourages convergence of unnecessary personnel who hinder the efficient running of the control room/centre.

3.2 Plans

In addition to the Mine Ventilation and Rescue plan, as required by the **MHSA** regulation 17(19), adequate up to date copies must be available for every rescue team proceeding underground.

Location plans - Large-scale locality plans and small scale plans of area to be available.

The master working plan, laid flat on a table must be continuously updated during the emergency with the following information:

- Position of Fresh Air Base (FAB) (with telephone numbers)
- Exact location of all seals and stoppings completed and under construction
- Position of rescue teams, whether at FAB or performing a task. (use detachable adhesive decals)
- Demarcation of numbered monitoring points with the latest results. (Detachable labels showing time of measurement and result)
- Depict airflow directions and quantities.
- Escape routes
- Position of explosive boxes.
- Sub- stations and electrical gear.
- First aid stations.
- Telephone positions and numbers.
- Refuge bays.
- Water and air valves.
- Vent doors and regulators (opened or closed);
- Fire doors;
- Identified risks e.g. open orepasses, fall of ground, gas emissions, water accumulations, etc.

Other plans should be available indicating:

- Water reticulation.
- Compressed air reticulation.

It must be stressed that the plan issued to rescue teams must be identical to the master plan to avoid any confusion.

The numbering of stoppings, gas monitoring points and any other relevant information must be entered on all plans (coding of these points must correspond with rescue teams reports).

3.3 Telephone and Communication

No emergency operation can function efficiently without a good communication system.

To achieve this, it is management's responsibility to ensure the following systems are immediately established:

- A fixed line unrestricted by area dialling, to facilitate calls for example to emergency equipment (material) suppliers and the requisitioning of rescue teams by mines rescue service provider;
- Internal (PABX type) telephone system for mine calls;
- Telephone communication with the FAB; and
- A dedicated line or an interface from the control room/centre down the mine to the FAB to facilitate communications between the sub- strata radios and telemetering systems.

3.4 Furniture and Fittings

Adequate table space must be available for work on plans.

The scribe, keeping the records of all procedures should be slightly detached from the desk of the manager in control to prevent him from being interrupted from other activities.

If a separate rescue team briefing area cannot be provided, then sufficient space and table layout should be made available to accommodate at least 2 teams concurrently.

A small stationery cupboard, kept locked when not in use for the supply of coloured pens, writing materials, graph paper, detachable labels, team briefing, instruction sheets and a copy of this file should be provided.

Plan covers, available from mines rescue service provider should also be available in order to protect plans taken underground.

Pin boards, fixed to the wall should be of sufficient size to accommodate plans of all the mine workings mentioned in section under Plans.

Lighting must, for obvious reasons, be excellent. Make provision for standby lighting in case of a power failure.

Seating facilities in the control room must be limited to prevent the natural tendency of well-intentioned people with no specific function to distract control management with unimportant matters.

A rescue team control board showing the times and movement of teams should be a permanent fixture.

All colliery control rooms should be equipped with a barometer and a graph for plotting the result of gas samples.

Provide for easy access/facilities to monitor gas detector trends and major ventilation equipment status.

4. GENERAL ORGANISATIONAL STRUCTURE OF A CONTROL ROOM

4.1 Personnel Requirements

During the immediate post disaster period, control efficiency is downgraded due to 3 main reasons.

- (a) Lack of accurate information regarding the severity, extent and the exact location of the incident.
- (b) The summoning of key personnel not fully utilised.
- (c) From (a) and (b) above - no clear plan of action having been formulated.

During this period, people milling around the control room trying to establish emergency procedures and systems hamper management's decision making. These persons should not have access to the control room. Once the initial stage is resolved and a strategic plan has been adopted, the control room should be manned by the following personnel:

4.1.1 Manager in Charge

For further reference, detailed "Duty Checklists" (Annex III) are enclosed. These checklists should serve as the initial action strategy.

This person, usually of senior status, takes overall charge and responsibility during his shift in the control room.

Consequently all decision-making revolves around him, and only he should brief rescue teams, give instructions and communicate with rescue teams.

All special instructions given, known hazards and hazards reported by teams during the incident should be clearly and fully recorded in a situation log that is kept on a 24-hour clock system.

It is imperative that shift changeovers be performed thoroughly, and that the incumbent personnel in control is completely au fait with:

- (a) The overall strategy
- (b) Progress thus far achieved
- (c) Available resources, both human and material
- (d) Ventilation flows and gas sampling records and trends.
- (e) Temperatures, visibility and any other relevant information.

(f) Location of operating, back-up and standby rescue teams

(g) Oxygen pressures of the teams breathing apparatus

Only once the above has been communicated the incoming manager, the outgoing manager may take leave of the control room.

The manager in charge should strive to avoid deviating from the pre-planned strategy. Changes of instructions lead to confusion and time wastage and also portrays a lack of leadership and credibility.

The Manager in control must impart an attitude of urgency, efficiency, calmness, friendliness and discipline. (Be in control of the incident)

NB: Avoid placing a person in charge that has insufficient knowledge and experience of the area, fire fighting or rescue operations.

The manager must be receptive to accepting advice and not be dogmatic about his personal views. He should continuously refer to back-up documentation and the identified checklist.

Before any rescue team is deployed, the possibility of other risks associated with the emergency must be considered and assessed as far as reasonably practicable.

Decisions should be recorded and be based on:

- State of the ventilation;
- State of the atmosphere in the mine (in or near explosive range);
- Source of ignition. Great care should be exercised if spontaneous combustion is suspected;
- Presence of gas due to walls of sealed areas being damaged;
- Likelihood of survivors.

4.1.2 Media Relations

Any emergency, particularly those that involve multiple fatalities, or missing employees are likely to be of public interest and liable to warrant the attention of the media.

Handling the media can be a sensitive matter. An early, open and technically accurate interview or statement with regular updates can result in fair and sympathetic reporting under what can be adverse circumstances.

It is well known that some media reporting can be emotive, speculative or inaccurate. This fact should be kept in mind when dealing with the media.

All statements issued by the mine to the media should be officially issued by the owners, mine manager or designated media liaison officer. No off-the-cuff interviews and ad-hoc comments should be given by other officials.

They should refer any media queries to the above mentioned persons and avoid reporting "good news" without being sure of the facts.

4.1.3 Environmental Control

An experienced senior environmental official plays an invaluable role in fire and environmental control. His knowledge and advice on airflow, quantities and expertise in identifying sealing sites for the construction of stoppings makes him an integral member of the control room team. (It may be necessary to call upon expertise of previous officials with knowledge of historical incidents).

By interpretation of gas samples and temperatures trends, coupled with knowledge of air movement across a fire, the environmental specialist can, with fair accuracy, interpret the fire behaviour and effectiveness of the total strategy.

This department should be consulted in the following matters:

- Planning of reconnaissance patrols;
- Locating the incident using their up to date and comprehensively detailed mine ventilation and rescue plans;
- Giving advice whether normal work can continue or be restarted in other areas.
- Provide gas detection instruments and environmental staff to assist underground.
- The stopping and starting of any fans.
- Check on all matters relating to the environmental systems affected by the fire.

4.1.4 The Scribe

This should be a person well versed in mining operations, with the experience in how to record the sequence of events.

The scribe's function is to maintain accurate comprehensive records of all proceedings, instructions and reports during the incident. These records can be in either a formal minute book or on prescribed forms, which are kept on file.

The Scribe duties include recording the following:

All special instructions from the manager in control and hazards reported or known.

All information reported from the FAB or team captains via sub-strata radios or speakerphone.

Material requirements from underground and deliveries thereto.

Maintenance of the rescue team control board.

Safekeeping of rescue team pre-operational medical examination forms

A separate book for task progress to be maintained in collaboration with the manager in control.

Should keep a list or documentation regarding e.g. contact no's, gas analysis monitoring form, O₂ pressure.

Gather duty rosters from discipline heads and display at a conspicuous place.

4.1.5 Mines rescue service provider official

This official will automatically be present throughout the deployment of visiting rescue teams. They are also available whenever requested by management.

This official has vast experience in various disasters and incidents and this experience can be well utilised in the formulation of a strategic plan and the ensuing control of operations.

This official's functions at an incident include but are not limited to:

- Advice and recommendations on options of fire control methods including types of equipment and materials available.
- Arranging for the supply of this equipment/material.
- Advice on rescue team modus operandi.
- Rescue team protection.
- Radio communication
- Hot and humid atmospheres
- Continuous gas monitors.
- Potential hazards identified by teams operating in area (risk assessment) or in the event where it is the first team entering the area.
- Obtaining of other specialist's knowledge.
- Current technology available.
- The control and requisitioning of additional rescue teams.

- Repairs and maintenance to breathing apparatus as well as spot checks on leakage tests/systems checks.
- Meeting teams and informing them of strategies in progress and history of the fire.
- Ensuring Rescue Team Members compliance to code of practice with respect to inter alia:
 - Modus Operandi.
 - Ancillary and safety equipment.
 - Medical examinations.
 - Leakage/Systems checks on breathing apparatus.
 - Competency levels to special tasks.

The aforementioned designated persons are all that is necessary to remain permanently in the control room. However, other skills and expertise are required frequently, and these people should be available if required, depending on the incident.

4.1.6 Runner

Usually of supervisor status. This person is required to ensure material is loaded for transport down the mine, deliver messages and perform general tasks which would otherwise compromise the duties of the control room team.

4.1.7 Engineering Department

A senior member of this department must be on immediate call for breakdowns or stoppages e.g. fans, pumps etc. It is also his duty to ensure continuous communication systems and an adequate water supply to the effected area.

He must alert ESCOM or other Electricity Suppliers to ensure uninterrupted electric power to the mine.

Arrange for 24-hour back up from the engineering workshop.

4.1.8 Survey Department

Personnel on immediate call for the supply of plans or other related matters. i.e. telephone numbers available, of potential hazards (Dykes, Fissures, Faults, New holings, open orepasses etc.)

4.1.9 Human Resources Department

Their responsibility includes:

- Compiling duty rosters to ensure continuity of service departments.
- Change-house facilities for visiting teams.
- Arrange guides and bearers for rescue teams.
- Arrange food and beverages
- Press/news media control.
- Ensure tight security at mine entrances.
- Arrange transport and accommodation for teams if required.

4.1.10 Stores

Required for the issuing and control of material and equipment.

4.1.11 Medical Staff

Required for the examination of the mines rescue teams if necessary and to provide coverage for any emergency during the operation.

4.1.12 Gas Monitoring/Analysis Personnel

Analysis of gas samples can be done by making use of for example, the Gas Chromatograph and the Mobile Gas Analysing Laboratory (MOGAL) on collieries and the Trugas - analyser for goldmines.

4.1.13 Fresh Air Base Official

Where possible each FAB must be manned around the clock by an official. There is no job category for this official, but senior supervisor level is preferable.

Cognisance should be taken of persons with an intimate knowledge of the history of the effected area e.g. previous fires/vent. breakdowns etc.

The functions of this person is *inter alia* to control the labour at the FAB, ensure efficient off-loading of materials and equipment, the removal of empty material cars, preventing unauthorised entry past the FAB, manning the radio, ensure communication services with management in control.

Local knowledge of the area is of great importance to rescue teams and it is obviously advantageous if this official has this local knowledge.

It must be stressed however, that the line of communication between team captain and manager in control is direct, and no instructions to the teams should be given by the FAB official.

Shifts of the FAB official ought to be of 8-hour (12 hours bank to bank) duration and rosters must be timeously drawn up and displayed.

4.1.14 Security Department

Personnel are required to ensure crowd control and no unauthorised entry onto the mine. They would further be utilised for asset protection.

4.2 Conclusion and Recommendations

The most important components to achieve success in directing emergency operations are:

- 4.2.1 A clear, concise Emergency Procedures Manual, regularly reviewed and updated which all key personnel are thoroughly familiar with. (All key personnel to keep a copy at home)
- 4.2.2 An effective Control Room/Centre.
- 4.2.3 An effective Fresh Air Base/s.
- 4.2.4 Conversant with all related hazards and effective treatment of the risk.
- 4.2.5 Correct Deployment of teams.
- 4.2.6 Availability of and speedy flow of Material down the mine.
- 4.2.7 Accurate monitoring of Ventilation Air and Gas Analysis.
- 4.2.8 Availability of Specialised Literature and Persons for consultation.
- 4.2.9 An effective two-way Communication System.
- 4.2.10 Access to Specialised Equipment.
- 4.2.11 An efficient Water Reticulation system.
- 4.2.12 Keeping in mind and treat them as such: Rescue brigade team members are well trained motivated persons but.....HUMAN
- 4.2.13 Prompt return to operation is essential in reducing the financial impact on an organisation of the loss of its ability to operation due to an emergency. Once the emergency has passed, a post mortem of the incident should be held. The procedures, instructions and strategy should be subject to reviewed. Any review, even if there are no changes, must be dated and signed by the responsible persons.

ANNEX III - DUTIES AND RESPONSIBILITIES IN THE EMERGENCY CONTROL CENTRE (CHECKLIST)

(For information purposes only)

1. INTRODUCTION

When any **emergency** arises, it is essential that those involved are fully aware of their duties and responsibilities. This requirement extends to all levels of personnel and should be part of any **emergency** control centre.

Initially, the most senior technically qualified person takes charge and issues such immediate instructions deemed necessary to safe guard life and property. This person then contacts the appropriate subordinates putting into action the required response from each department.

These checklists are intended to ensure that actions required are carried out diligently and that information is retained for future reference during enquiries.

Kindly note that the checklists are generic to assist during most incidents, however, each incident may pose unique instructions that should be included on the checklist.

2. DUTIES AND RESPONSIBILITIES IN THE CONTROL CENTRE

1. THE MANAGER

No.	ACTION	RESPONSIBLE PERSON	COMPLETED	SIGNATURE
1	Only one legal technical qualified manager take control.			
2	Establish a Record Logbook and arrange for a Scribe.			
3	Notify Rescue Manager to arrange for two own rescue teams to report to control.			
4	Notify mines rescue service provider regarding rescue team utilisation and assistance.			
5	Notify Department of Mineral Resources.			
6	Notify police in event of any fatalities.			
7	Arrange for press liaison personnel if applicable.			
8	Gather information from responsible persons and ask relevant questions.			
9	Identify affected areas. Evacuate employees from affected areas and clear shift.			
10	Identify critical equipment needed and delegate arrangement of it.			
11	Identify services needs and ensure availability.			
12	Brief all responsible persons accordingly (include contractors).			
13	Ensure all applicable persons sign a declaration of non-disclosure of information			
14	Barricade areas off and plot on plans.			
15	Decide on strategies in conjunction with management team.			
16	Set objectives. (Minimise loss or exposure of men, material, environment, costs)			
17	Draw up a duty roster. (Be flexible – the situation will determine the need. Ideal is to have two manager on twelve hour shifts continuity)			
18	Set times for progress report meetings and to re-assess strategies. Update pin board accordingly.			
19	Measure effectiveness of strategy plan to set objectives. Alternate plan if initial objectives cannot be met.			
20	Any changes to set objectives or entry to affected area must be approved by the manager in control.			
21	Determine labour requirements for the incident.			
22	Re-deploy other production labour.			
23	Notify other shaft or mines that may be affected.			
24	Brief and issue instructions to rescue teams.			
25	Ensure rescue teams documentation is in order.			
26	Record findings of teams in Record Logbook			
27	Debrief rescue teams.			
28	Brief management, service departments, DMR, Union, Health and Safety Representatives on situation, planned objectives, progress and strategy.			
29	Ensure rescue teams sign a disclosure of information document.			
30	Brief medical personnel on potential assistance needed (possible number of casualties).			
31	Issue rescue teams with a body recovery document if applicable.			
32	Issue rescue teams with a "Rescue from Refuge Chamber" document – if applicable			
33	Obtain fire/incident cost code form Accounting Department.			

2. THE ENGINEER

No.	ACTION	RESPONSIBLE PERSON	COMPLETED	SIGNATURE
1	Report to Control Centre frequently.			
2	Ensure preferential treatment from power supplier (ESCOM).			
3	Supply control room personnel with telephone number of affected area.			
4	Notify other shafts/mines regarding power supply problems.			
5	Prepare contingency plan in event of loosing a fan.			
6	Ensure availability of hoists.			
7	Re-arrange scheduled shaft times if applicable			
8	Brief all responsible persons accordingly.			
9	Maintain dam level (plus 80% if possible).			
10	Be aware that pH of water will change.			
11	Notify other affected shafts of Point. 10.			
12	Ensure clearance of stations at affected levels.			
13	Ensure availability of transport where applicable.			
14	Ensure availability of equipment operators (Locos, Incline winches & Surface trucks).			
15	Arrange for applicable artisans to be placed on standby.			
16	Ensure availability of communication lines to Fresh Air Base.			
17	Ensure isolation of applicable services to affected area.			
18	Utilise and arrange necessary equipment/material from other shafts/mines.			
19	Arrange frequent inspections of fan blades in affected areas (tar accumulation).			
20	Ensure continuity of power supply to control room.			
21	Establish duty roster of applicable engineering personnel with sound knowledge of affected areas, detector heads where applicable and mine.			

3. ENVIRONMENTAL

No.	ACTION		RESPONSIBLE PERSON	COMPLETED	SIGNATURE
1	From detector heads available, define the probable location of the fire (affected area).				
2	Identify affected areas and affected shift workers.				
3	Locate fire vent districts.				
4	Plan reconnaissance patrols if applicable.				
5	Identify safest routes to evacuate affected shift.				
6	Warn adjoining shafts/mines.				
7	If available, supply previous master fire plans of affected area.				
8	Identify dedicated chimney (borne risk in mine, consider as high risk area all the time).				
9	Schedule duty roster (shifts to overlap with manager in control. Do not change shift the same time as the manager).				
10	Provide/supply gas detectors, monitors, gas tubes.				
11	Interpret the fire behaviour and effectiveness of the total strategy. What effect will any changes have on the strategy?				
12	Advise management where work can continue without putting any employee at risk.				
13	Monitor	Status of main and booster fans			
		Pressure of sealed off area			
		Fire chimney conditions			
		Gas detector trends			

4. SURVEY

No.	ACTION	RESPONSIBLE PERSON	COMPLETED	SIGNATURE
1	Supply control centre with plans and always have at least 3 complete sets of plans available.			
2	Ensure plans are updated accordingly after monthly planning sessions.			
3	Supply updated locality plans as required of affected area for rescue teams usage.			
4	Update rescue plans and colour as per master plan.			
5	Identify and mark current workings on plans. Add "self-stick notes" on plans with work group names and number of employees in the area.			
6	Highlight fire districts on plans.			
7	Highlight natural barriers on plans.			
8	Highlight faults on plans.			
9	Highlight boundary pillars and any hollows through them.			
10	Supply section plans for suspect areas.			
11	Identify reference pegs on plans.			
12	Schedule duty roster survey personnel conversant with affected area.			
13	Ensure access to survey office after hours.			

5. HUMAN RESOURCES

No.	ACTION	RESPONSIBLE PERSON	COMPLETED	SIGNATURE
1	Ensure clearing of shift, report missing person(s).			
2	Supply updated telephone list of all related control personnel.			
3	Parade required employees needed for assistance.			
4	Ensure affected area personnel crush control.			
5	Arrange union and safety representatives.			
6	Arrange meetings when requested.			
7	Arrange update/progress meetings unions.			
8	Arrange/control media.			
9	Arrange security personnel when/where required (access control).			
10	Receive rescue teams and arrange change house accommodation.			
11	Supply meals and beverages to control personnel.			
12	Supply meals and beverages to rescue teams as required.			
13	Notify family member in cases of disaster.			
14	Arrange transport for family members when required.			
15	Arrange accommodation for family members when required.			
16	Arrange briefing times and area with family members.			
17	Arrange designated area for press releases if/when required (refreshment).			
18	Arrange necessary documentation in case of accidents or fatalities.			
19	Arrange guides/bearers for rescue teams if available.			
20	Arrange posttraumatic treatment for rescue teams if necessary.			
21	Arrange posttraumatic treatment for applicable employees involved with disaster if necessary.			
22	Arrange medical observation for employees and rescue teams being in contact with body fluids			
23	Arrange correspondence to management of assisting mines (thank you letters).			
24	Arrange parking and security for vehicles of rescue teams.			
25	Schedule duty roster to ensure continuity of service departments.			

6. SECURITY

No.	ACTION	RESPONSIBLE PERSON	COMPLETED	SIGNATURE
1	Arrange access for mines rescue service provider and equipment.			
2	Arrange access for rescue teams, equipment and parking.			
3	Ensure access control of public.			
4	Ensure access control of press/media.			
5	Direct press/media to predetermine designated area (liase with the Human Resource Department).			
6	Direct public to predetermined designated area (liase with the Human Resource Department).			
7	Notify manager in control of press/public/media attendance.			
8	Barricade off area around shaft to ensure access for ambulance if applicable.			
9	Ensure crowd control.			
10	Ensure traffic control.			
11	Escort people into and out of mining area.			
12	Arrange investigation teams, if applicable (arson).			
13	Ensure equipment control from stores to underground.			

7. MEDICAL

No.	ACTION	RESPONSIBLE PERSON	COMPLETED	SIGNATURE
1	Be available to conduct medical examination of mine rescue teams if required and enter findings on appropriate documents.			
2	Notify hospital(s) and other emergency medical personnel of incident magnitude, possible number of casualties, and type of injuries.			
3	Prepare medical facilities to be in state of readiness.			
4	Notify ambulance personnel to be on standby.			
5	Ensure readiness to proceed underground when required.			
6	Schedule medical staff for duration of incident.			
7	Supply manager in control with emergency telephone number of other emergency services available, if requested.			
8	Inform hospital(s) personnel in the event of rescue team members being in contact with body fluids.			

ANNEX IV – SCHEDULE OF ADDITIONAL REFERENCES

(For information purposes only)

- Chamber of Mines Research Organization (COMRO) '*ResQpacs; How to calculate safe travelling distances*';
- The Lamproom Guidance Note issued by the Chief Inspector of Mines, OH-11-2003 dated 30-06-2003);
- Safety in Mines Research Advisory Committee, SIMRAC, research report COL 605 "*A Manual for best practice for emergency response procedures*";
- Safety in Mines Research Advisory Committee, SIMRAC, research report COL 801 "*Analysis of Emergency Care Provided for Injured Miners in the South African Mining Industry, and Recommendations for the provision of Emergency Care*";
- Disaster Management Act, Act No 57 of 2002;

Note: The above list is not exhaustive and it is recommended that publications from Mine Professional Organisations, SIMRAC, DMR, etc. could be consulted.

NOTES

NOTES



mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA