COP : Code of Practice

Emergency Preparedness

Harmony Group

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This Document Supersedes all previous Code of Practices issued by Harmony, JCI, Armgold, Freegold, Avgold / Avmin, Goldfields, Pamodzi, Gencor or any other Mining Group.

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NAME	DESIGNATION	QUALIFICATIONS	EXPERIENCE	SIGNATURE

Emergency Preparedness

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1 STATUS OF THIS MANDATORY COP

1.1 The revision of this Mandatory Code of Practice is still in accordance with Guideline DMR Reference Number DME 16/3/2/1-A5 issued by the Chief Inspector of Mines.

1.2 This Code of Practice is a mandatory Code of Practice in terms of Section 9(2) and (3) of the Mine Health and Safety Act, 1996 (Act 29 of 1996) as amended.

1.3 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.

1.4 This COP supersedes all previous relevant COP‘s.

1.5 All Managerial Instructions and standards on the relevant topics complies with this COP and have been reviewed to ensure compliance.

2 GENERAL INFORMATION:

2.1 Description and location of the Mine

The Mine consists of *Insert Operations name* situated on the south eastern side of town of Welkom in the Free State province.

2.2 Commodities Produced

The operation is a gold producing entity.

2.3 Mining methods and Excavation Processes

Mining takes place on the conventional pillar extraction mining method and conventional stoping methods.

2.4 Unique features of the Mine

Mining is concentrated on extracting pillars left as well as virgin ground. The underground workings are divided into ventilation districts. The shaft is ventilated with 3 surface fans handling 770m³/s and a 21128KW bulk air cooler situated on surface cooling 450m³/s and also provide120 l/s of chilled service water to our underground workings. Water from underground workings is pumped to 4 # via the 2nd outlet at 2010 level .The Mine utilizes “centralized blasting” which reduces the risk of possible personal exposure related to blasting.

3 TERMS [ACRONYMS] AND DEFINITIONS:

3.1 **'CO'** means Carbon Monoxide

3.2 **'CO2'** means Carbon Dioxide

3.3 **'CH4'** means methane or other flammable gas.

3.4 **'COP'** means Code of Practice

3.5 **'DMR'** means Department of Mineral Resources

3.6 **'MHSA'** means Mine Health and Safety Act, 1996(Act No. 29 of 1996) as amended

3.7 **'EMPLOYEE'** means a person who is a mine employee or a contractor employee working on the mine.

3.8 **'SCSR'** means Self Contained Self Rescuer

3.9 **'GENDER'** means wherever the masculine gender is referred to, it must also be taken to include the female gender.

3.10 **'MONITORING'** means the repetitive and continued observation, measurement, and evaluation of health and / or environmental or technical data, according to pre-arranged schedules, using nationally or internationally acceptable methodologies.

3.11 **'MRS'** means Mines Rescue Services

3.12 **'NOVICE'** means an individual with no prior experience of mining as a career.

3.13 **'OCCUPATIONAL HYGIENIST [OH]** means a person with the relevant qualifications to administer the occupational hygiene activities and emergency preparedness coordination.

3.14 **'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 have been rendered fire-retardant 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;

3.15 **'EMERGENCY'** means any 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;

4 RISK MANAGEMENT:

4.1 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, record the significant hazards identified and risks assessed. The employer determines how the significant risks identified in the risk assessment process must be dealt with, having regard to the requirements of sections 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.

4.2 To assist the employer with risk assessment all possible relevant information such as accident statistics, ergonomic studies, research reports, manufacturers specifications, approvals, design criteria and performance figures for all relevant equipment should be obtained and considered. In this regard there will be close liaison between the Occupational Health Practitioners and the Occupational Hygiene and Safety Departments, with regular reports to the Mine Managers.

4.3 In addition to the periodic review required by section 11(4) of the MHSA, this code of practice will be reviewed and updated as necessary after every serious incident relating to the topic covered in the COP, or if significant changes are introduced to procedures, mining and ventilation layouts, mining methods, plant or equipment and material. This COP will be reviewed every 2 years or if new technology becomes available, after an accident or on request of the Health and Safety Committee.

An Issue Based Risk Assessment has been conducted to identify possible emergencies and institute Managerial Instructions, Emergency Procedures and standards which can mitigate the residual risk and which can support this Code of Practice.

5 ASPECTS ADDRESSED IN THIS COP

5.1 Emergency preparedness measures

5.1.1 Detection and early warning systems

In order to ensure that emergencies are detected as early as practicably possible and persons are warned timeously such emergency:

5.1.1.1 Types and position of fixed detectors / early warning systems for fires, gas, and seismicity are as follows.

Electronic Carbon Monoxide detection heads and smoke detection heads are distributed throughout the mine on the return air side of working and travelling areas as indicated by continuous risk assessment processes. The position of these detectors is determined by the Mine Manager in consultation with the appointed Occupational Hygienist.

Seismic detection (geophones) systems are installed to detect seismic events where continuous risk assessment processes indicate a significant risk. The position of the seismic detection stations is determined by the Mine Manager in consultation with appointed Rock Engineer in terms of the requirements of Regulation 14.1(8) of the Mine Health and Safety Act as amended.

Power failure detection devices are installed on main and booster fans, critical pumps, dams and in shaft bottoms as may be indicated by continuous risk assessment processes. The position of these detectors is determined by the responsible appointed Engineer in consultation with the Chief Electrician.

Type and quantity of fixed detectors are shown in the tabulation depicted on Annex vii

5.1.1.2 Types and quantity of personalized detectors / early warning systems.

Harmony standardized on the handheld GDI multi-gas detector which is a spot as well as a continuous monitoring instrument conforming with SANS standard SABS-1515 for carbon

monoxide and flammable gas. The census of available instruments is shown in the tabulation below:

Table 1 – Inventory of portable multi-gas detectors

Quantity	Type	Make
400	GDI multi gas	Schauenburg

5.1.1.3 Procedure for issue of personal detectors.

The issue and control of personalised detectors is done as specified in the "MANAGERIAL INSTRUCTION" for Lamp Rooms (MI EQ 16) and the Code of Practice for Flammable gas (COP 5).

Harmony adopted the previous best practice in the repealed Minerals Act Regulations which catered for the allocation of instruments on a "two per working gang" principle.

5.1.1.4 Procedure to ensure actual settings of alarms remains effective.

The "MANAGERIAL INSTRUCTION" for Lamp Rooms (MI EQ 16) specifies the procedure for ensuring actual and effective settings of alarms.

All appointed Lamp room Supervisors are trained by the instrument OEM's in the maintenance, calibration and permitted repairs on all instruments.

5.1.1.5 Frequency of maintenance, calibration etc.

The 'MANAGERIAL INSTRUCTION" for Lamp Rooms (MI EQ 16) specifies the procedure for ensuring maintenance and calibration of gas detection instruments.

The services of the Original Equipment Manufacturers (OEM) are employed on contractual agreements.

Maintenance of Seismic network monitors is done according to Rock Engineers recommendations.

5.1.2 Communication systems.

5.1.2.1 Type of system for effective communication and backup.

Telephones are installed at strategic places such as shaft stations, waiting places refuge bays, pump chambers and engineering workshops.

MRS Rescue Teams make use of "Barking Dog system" and radio frequency radio's during emergencies.

"E-cam" telephones which are plugged into telemetering boxes of the fire detection system for an alternative communications system.

The telephone network is provided with an uninterrupted power supply (UPS) system for back-up power in the event of a power failure.

5.1.2.2 Communication from the mine to outside parties.

Communication during emergencies to outside parties (e.g. neighbouring Mines, Department of Mineral Resources, Mine Rescue Services and the media where applicable) will be done by the Mine Manager in consultation with the General Manager.

For this purpose, emergency control centres are equipped with telephones and Information technology systems (computers) with "E-mail" facilities.

Cell phones may be used to do any communication to external agencies.

Media Response Reports will be completed and communicated to the Executive-Investor Relations by the General Manager. (Refer to ANNEX V)

5.1.2.3 Testing of effectiveness

- The Shaft Electricians conduct tests on the Shaft Telephones and E-cams on a weekly basis when performing “bell testing”.
- Shift Bosses test underground telephones in their area of responsibility, and report deficiencies.
- Occupational Hygiene and Safety Officers test telephones during routine visits and report deficiencies.

5.1.3 Emergency medical care

In order to ensure that appropriate emergency medical care and facilities are readily available to deal with any emergency, the following provisions will apply;

5.1.3.1 **Provision of emergency medical care**, including the locality of facilities, provision of suitably trained medical personnel, response times, and capabilities to treat and evacuate multiple injured persons.

Emergency medical care will be provided as follows.

- A properly equipped medical station is provided at the shaft. This medical station is manned 24 hours
- The arrangements for the provision of emergency medical care in the form of First aid equipment will be in accordance with the MANAGERIAL INSTRUCTION for “FIRST AID EQUIPMENT BAGS” (MI SAF 14)
- Holders of valid first aid certificates will be provided with an equipped belt worn First Aid pouch in accordance with the MANAGERIAL INSTRUCTION for “BELT WORN FIRST AID POUCHES” (MI SAF10)
- A contractual agreement with an accredited emergency medical care provider for assistance on a 24 hour / 7 days a week basis if and when the need may arise is in place. (Ambulance/Paramedics) Currently NETCARE 911 is the appointed service provider.
- All persons under the age of 50 years in charge of workmen are required to be a holder of a valid First aid certificate issued by an accredited training provider. Such certificate will be renewed every three years.
- All persons required to operate power driven machinery (excluding rock drills) are required to have a valid First aid certificate issued by an accredited training provider. Such certificate will be renewed every three years.
- As a result of the remoteness of the working areas from the shafts, it may take extended periods for injured persons to receive advanced medical assistance and therefore, communication systems must be in place so that such advanced medical assistance may be summoned as soon as reasonably practicable. The call out of such advanced medical assistance (Paramedics/ Ambulance should not be delayed unduly)

Refer to “CALL OUT PROCEDURE FOR MEDICAL EMERGENCIES” EMERGENCY PROCEDURE (EP-AC 1)

5.1.3.2 Availability, Locality, Quantity and Variety of Emergency Medical Equipment

Medical station has been provided at the mine. This medical facility is equipped in accordance with the MANAGERIAL INSTRUCTION for “First Aid Rooms” (MI SAF 8). A fully equipped medical station is situated at *Insert Operations name*.

5.1.4 Mine Evacuation and escape routes

5.1.4.1 Procedure for escape and rescue of persons.

In order to ensure the safe evacuation and escape of persons in the event of an emergency, the following will apply:

- Escape routes and alternative routes have been identified and demarcated from workplaces to a place of safety. This includes routes to 2nd outlets at the other shaft. During an emergency, the Mine Manager in consultation with other relevant persons will determine search and rescue strategies. The first and foremost priority is to safeguard persons. This will follow an Issue based Risk assessment of each particular emergency. No person other than a Team of Rescue brigades men will enter any area containing or likely to contain harmful gases and smoke or areas which have become unsafe accept upon direct instruction of the Mine Manager from "Central Control" and instructions properly minuted.

- In the event of persons having to be rescued from confined spaces such as ore passes and elevated places such as shaft head gears, a Rescue brigade will be called out to perform the rescue as they received the necessary training to do so.

5.1.4.2 Provisions of places of safety.

- Refuge Bays will be provided at places and distances as specified in the MANAGERIAL INSTRUCTION FOR REFUGE BAYS, MI SAF 15.

- The document issued by the Chamber of Mines Research Organisation (COMRO) *"ResQpacs; How to calculate safe travelling distances*" has been consulted to identify the positioning and spacing of refuge bays.

5.1.5 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 following will apply.

5.1.5.1 Content and frequency of training;

- Induction training is done on emergency and evacuation procedures as well as in the use of SCSR's which is applicable to the mechanised development section.

- Annual refresher training is done on emergency and evacuation procedures as well as in the use of Self Contained Self Rescuers which is applicable to the mechanised development section.

- Visitors required to enter the mechanised development section will receive self-rescuer training prior to proceeding underground.

- Fire drills will be conducted by the appointed responsible Shift Boss on a quarterly basis and the results logged in the Shift Boss's logbook.

- Surface fire drills will be done six-monthly. Consult Emergency Preparedness

- Seismic warnings will be identified and distributed by the Rock Engineer to the appropriate supervisors.

- Special instructions from Rock Engineer to be adhered to (e.g. support recommendations, Risk rating, Blasting Schedules, Remnant Precautions etc.)

5.1.5.2 Procedures and appropriate actions in the event of an emergency.

Establish control and adhere to the relevant procedure as outlined in the following Emergency Procedures as may be applicable:

EP-AC 1	Call out of Emergency Medical Services
EP-AC 2	Heat Related Illness Incidents
EP-E1	Action to be taken in the event of a “Main Electrical Power Failure”
EP-E 2	Compressed Air Failure
EP-OH 1	Inter shaft airflow, refrigeration and escape routes
EP-OH 2	Environmental Engineering contingency plans
EP-F1	Surface Fire Procedure
EP-F2	Required action to be taken in the event of an Underground fire.
EP-F3	Electronic fire detection system – Responsibilities and duties of Personnel.
EP-F4	Emergency Procedure for a fire in battery charging Bays, stores, workshops, sub-stations, oil stores and Diesel bays.
EP-F5	Fire in Shaft or in Shaft Conveyance
EP- W 1	Flooding of Shaft Bottoms
EP- W 2	Intersection of Excessive Water
EP-EXP 1	Action to be taken in the event of a gas explosion
EP-S1	Major ground movement or seismic event
EP-SH1	Action to be taken in the event of a winding or shaft accident.
EP-G1	Exposure to blasting fumes
EP-G2	Escape of gas or noxious fumes
EP-C1	Chemical spillage
EP-HR1	Riots, strikes on industrial unrest

5.1.5.3 Correct procedures and applications for the use of emergency equipment

- Rescue Team Equipment will be available in the respective Rescue Rooms and will be stocked as required by MRS recommendations.
- Rescue Equipment not in Rescue Rooms will be stored at a centralized position.
- Central store / Shaft Stores will be available for additional equipment on request.
- MRS has available a full range of specialised rescue equipment for use during emergencies.
- The Local Fire Department is available for surface emergencies.

5.1.5.4 Actions relating to location and description of shutdown controls / lockout devices.

The required action to be taken for the purposes of locking out a source of energy is described in Managerial instruction “Lock-Out Procedure”SAF-32.

5.1.5.5 Locality of copies of emergency procedures and instructions

This COP is available in electronic format on the Harmony INTRANET as well as in “hard copy” format in the Emergency Control Room, and with the Occupational Hygienist.

5.2 EMERGENCY RESPONSE MEASURES.

5.2.1 Rescue and response capabilities.

In order to ensure that emergencies are reacted to timeously, with adequate rescue and response capabilities, the following will apply.

5.2.1.1 The number of rescue personnel, arrangements for mobilisation, variety and access to specialised rescue equipment will be as follows:

- Number of Rescue personnel will be as per statutory requirements outlined in Regulation 16.5.1(a) i, ii, iii, and iv.
- A Rescue team Manager has been appointed who will be responsible for the mobilisation of Rescue teams as required in the event of any emergency.
- Contact details of Rescue Teams, Mines Rescue Services, Mine Key personnel, Ambulance Services, Fire Brigade, Asset Protection, Police Departments, ESKOM must be displayed in the Emergency Control rooms and Banksman Cabins.
- A Rescue equipment store will be stocked and maintained at a convenient position and inspected by the Rescue Team Coordinator at least monthly and results recorded.
- In addition specialised emergency rescue equipment can be obtained from the Mine Rescue Service provider based in all regions.
- Should the need arise for additional teams to be deployed, the Mines Rescue Services must be notified to mobilise additional teams from neighbouring mines.

5.2.1.2 Arrangements with Mines Rescue service provider

Harmony engaged the services of Mines Rescue Services as the service provider contemplated under MHSA Regulation 16.5.(1)(c) who is responsible for the training of rescue brigades men and the availability and maintenance of specialised rescue equipment and assistance during emergencies.

5.2.1.3 Additional instrumentation and equipment

The mine will equip rescue teams with additional rescue equipment and gas testing instrumentation as may be required by Mines Rescue Services.

5.2.2 Management of Emergencies

In order to ensure that emergencies can be managed and dealt with effectively, the following will apply:

5.2.2.1 Updating of Emergency manuals and contact details.

The updating of emergency manuals will be done at least every 24 months or such other shorter period as may be required by circumstances and after serious or repeated incidents, which might necessitate the revision of the manuals.

The Occupational Hygienist will be responsible to ensure that the contact details of neighbouring mines, Emergency services, internal and external telephone directories are available in the Emergency control centre and updated when detail’s changes.

5.2.2.2 Establishment of emergency control centres

The emergency control centres will be established and maintained as outlined in Annexure I.

5.2.2.3 Duties & responsibilities of persons required during an Emergency:

The duties and responsibilities will be as stipulated in the Mines Emergency Procedures.

5.2.2.4 Procedure to deal with adverse environmental engineering conditions during Emergencies.

The procedures to deal with adverse environmental engineering conditions, which could be encountered during an emergency such as flooding, gases, heat, etc. are included in the Emergency Procedures.

5.3 REPORTING AND RECORDING

In order to ensure that the emergency preparedness and response measures and procedures remain effective, the following will apply:

5.3.1 The procedure for inspection, testing and maintenance.

Current maintenance contracts are in place with Original Equipment Manufacturers of Self Contained Self Rescuers and Gas measuring instruments. Servicing, repairs and calibration schedules must be compiled and complied with by the appointed Lamp room Supervisor as prescribed in Managerial Instruction for Lamp rooms EQ-16.

Rescue Team equipment are inspected, tested and maintained in accordance with Mine Rescue Service protocols. This is the duty of the appointed Proto team Coordinator on the Shaft.

The inspection, maintenance and record keeping of fixed alarm systems and the electronic fire detection system is the duty of the Engineer.

5.3.2 The reporting, recording and archiving system at appropriate intervals.

The Lamp room Supervisor is responsible to ensure that accurate records are kept of all inspections, service and repairs to gas measuring instruments. Records must be archived for the life of an item.

Rescue Teams are responsible for the control and recording of service and maintenance intervals of their instruments and equipment in the Rescue Team logbooks. This will be checked on a monthly basis by the shaft Proto Coordinator.

5.4 EMERGENCY ASPECTS ADRESSED IN OTHER MANDATORY COP's

Emergency aspects are addressed in the following Codes of Practice.

COP -5 Code of Practice for the prevention of flammable gas explosions.

COP -7 Code of Practice for Thermal Stress

6 IMPLEMENTATION PLAN

6.1 Organizational Structure

The implementation, control and review of the Emergency Preparedness and Response program is managed and coordinated by the Coordinator Occupational Hygiene in consultation with the Occupational Hygienists. Table 2 summarizes the main duties and responsibilities in respect of overall control, co-ordination and appointees for the respective elements.

Table 2 – Emergency Preparedness and Response: duties and responsibilities in respect of overall control and co-ordination

Respective appointees and summary of the main features/activities associated with each element.

ORGANI-SATIONAL STRUCTURE AND COMMITTEES	RISK ASSESSMENT	RISK MANAGE-MENT	REVIEWS	INTERDEPART-MENTAL LIAISON	DATA ACQUISITION AND ANALYSIS	REPORTS
Occupational Hygienist	Line Management	OHS Department	OHS Department	OHS Department	Occupational Hygienist	Mine Manager
Health and Safety Committee	Chief Safety Officer	Health and Safety Committee	Health and Safety Committee	Line Management	Occupational Hygiene Coordinator	General Manager
Chief Safety Officer	Occupational Hygienist	Line Management	Shaft MANCOM	Occupational Health Department	OHS Pivot Coordinator	DMR
Line Management						Operational Team

6.2 INTERPRETATION OF DATA

Best practice methodologies will be applied to facilitate easy interpretation of data and highlight trends for the purposes of risk assessment

7 COMPLIANCE WITH THE COP

The Manager appointed in terms of Section 3. (1)(a) must institute measures for monitoring and ensuring compliance with the **COP**.

8 ACCESS TO THE COP AND RELATED DOCUMENTS

8.1 The Manager appointed in terms of Section 3. (1)(a) will ensure that a complete COP and related documents are kept readily available at the mine for examination by any affected person. Hard copies available at each shaft in the office of the Occupational Hygienist

Registered trade unions or associations 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.

The Manager appointed in terms of Section 3.(1)(a) will ensure that all employees are fully conversant with those sections of the COP relevant to their respective areas of responsibilities. (Resources such as training facilities and Health and Safety committees to be utilised)

ANNEX I - EMERGENCY CONTROL CENTRE; STRUCTURE AND PROCEDURE

1. Foreword

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:

i. Gathering and analysing information.

ii. Effective communication between various components.

iii. Planning strategy

iv. Briefing and instructing of operational staff and rescue teams.

v. Co-ordinating planned action.

vi. Direct operation.

vii. Involve all key personnel.

viii. Record keeping.

ix. Ensure safety of operational personnel.

x. Limit loss through effective management of the emergency.

xi. 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 radios, batteries and battery chargers as well as the mine ventilation and rescue plan and incident location plan. The mines rescue service provider representative should have a separate office with outside communication facilities.

A dimension of 35m^2 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.

Incident 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 Bases (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.
- Main isolating water and air valves.
- Vent doors and regulators (opened or closed);
- Position of explosive boxes
- Position of blind / raise borer holes
- Position of tight circuit fans
- Fire doors;
- Identified risks e.g. open ore passes, raise borer / vent. holes, fall of ground, gas emissions, water accumulations, etc.

Other plans should be available indicating:

- Water reticulation.
- Compressed air reticulation.
- Electrical 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 the Manager'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 working 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, check-lists for the control room members and a copy of this COP 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.

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 to 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.

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 fire fighting or rescue operations and of the area.

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. (Annex lll)

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 Occupational Hygiene Department

An experienced senior Occupational Hygiene official plays an invaluable role in fire and environmental control. His knowledge and advice on airflow direction, 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 Occupational Hygienist 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.
- Providing information regarding known methane accumulations and/or sources.

4.1.4 The Scribe

This should be a person well versed in mining operations, with the knowledge 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 are recorded in the "Central Control Record Book". "Occ Hyg report form OH 002"

The Scribe duties include recording the following:

- All special instructions from the manager in control.
- All hazards reported or known.
- All information reported to and from the FAB or team captains.
- 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 or written on the plan itself in ink.
- Should keep a list or documentation regarding e.g. contact no's, gas analysis monitoring form and oxygen cylinder pressures as reported by Team Captains
- Gather duty rosters from discipline heads and display at a conspicuous place.

4.1.5 Mines Rescue Service –Asst. Superintendent

This official will automatically be present throughout the deployment of visiting rescue teams, who 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 in "Control" 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 Logistics Co-ordinator

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 affected 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 ore passes, raise borer holes 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 through the General Manager
- 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 Trugas - analyser for goldmines situated at MRS Carletonville.

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 affected 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 Asset Protection 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:

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)

- An effective Control Room/Centre
- An effective Fresh Air Base/s.
- Conversant with all related hazards and effective treatment of the risk.
- Correct Deployment of teams.
- Availability off and speedy flow of Material down the mine.
- Accurate monitoring of Ventilation Air and Gas Analysis.
- Availability of Specialised Literature and Persons for consultation.
- An effective two-way Communication System.
- Access to Specialised Equipment.
- An efficient Water Reticulation system.

Keeping in mind and treat them as such: Rescue brigade team members are well trained motivated persons but……HUMAN

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 be reviewed. Any review, even if there are no changes, must be dated and signed by the responsible persons

ANNEX II - DUTIES AND RESPONSIBILITIES IN THE EMERGENCY CONTROL CENTRE

(CHECKLIST)

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.

DUTIES AND RESPONSIBILITIES IN THE CONTROL CENTRE

1. THE MANAGER IN CONTROL

No.	ACTION	RESPONSIBLE PERSON	COMPLETED	SIGNATURE
1	Only one legal technical qualified manager takes control.			
2	Establish a Record Logbook and appoint a Scribe.			
3	Notify Rescue Manager to arrange for “home” rescue teams to report to control.			
4	Notify Mines Rescue Services.			
5	Notify Department of Mineral Resources			
6	Notify SAPS / DMR 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’s 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.			

No.	ACTION	RESPONSIBLE PERSON	COMPLETED	SIGNATURE
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 shafts 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 bags and 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 Financial 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 numbers of affected area.			
4	Notify other shafts/mines regarding power supply problems.			
5	Prepare contingency plan in event of a surface or booster fan breakdown.			
6	Ensure availability of shaft conveyances.			
7	Re-arrange scheduled shaft times if applicable			
8	Brief all responsible persons accordingly.			
9	Maintain dam levels (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 persons from 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 except water and compressed air			
18	Utilise and arrange necessary equipment/material from other shafts/mines.			
19	Ensure continuity of power supply to control room.			
20	Establish duty roster of applicable engineering personnel with sound knowledge of affected areas, detector heads where applicable.			

3. OCCUPATIONAL HYGIENIST

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.(fire zoning)				
4	Plan reconnaissance patrols if applicable.				
5	Identify safest escape routes to evacuate affected shift.				
6	Remind the Manager in control to notify adjoining shafts / mines.				
7	If available, supply previous master fire plans of affected area.				
8	Identify dedicated chimney (borne risk in mind, 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 detector 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 concentration and temperature trends			

4. ORE RESERVE MANAGER

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 holings 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 and manning of 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.			

No.	ACTION	RESPONSIBLE PERSON	COMPLETED	SIGNATURE
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. ASSET PROTECTION MANAGER

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 manger 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. OCCUPATIONAL HEALTH MANAGER

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 manger 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 III – SCHEDULE OF ADDITIONAL REFERENCES

(For information purposes only)

- Chamber of Mines Research Organization (COMRO) 'ResQpacs; How to calculate safe travelling distances';
- The Lamp room 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 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 ids recommended that publications from Mine Professional Organisations, SIMRAC, DMR, COM, CSIR etc. could be consulted.

ANNEX IV

PRESS RELEASE RESPONSE SHEET

Response
WHO? Parties involved
WHAT HAPPENED?
WHEN
WHY?
HOW
WHERE
Plans going forward and any impact on production/operations?

Sound Bite

ANNEX V

Relevant Managerial Instructions / Emergency Procedures

Doc/Type + No.	Title	Part of this COP
	Managerial Instructions	
GEN - 5	Fire prevention standards in intake airways	No - for reference
EQ -16	Lamp room Procedure	No - for reference
SAF- 8	First aid rooms	No - for reference
SAF - 6	SCSR Training	No - for reference
SAF-10	First Aid Equipment – Equipment in belt worn pouches	No - for reference
SAF-14	First Aid Equipment Bags	No - for reference
SAF-15	Refuge bay procedures	No - for reference
	Emergency Procedures	
EP-AC 1	Call out of Emergency Medical Services	No - for reference
EP-AC 2	Heat Related Illness Incidents	No - for reference
EP-E1	Action to be taken in the event of a “Main Electrical Power Failure”	No - for reference
EP-E 2	Compressed Air Failure	No - for reference
EP-OH 1	Inter shaft airflow, refrigeration and escape routes	No - for reference
EP-F1	Surface Fire Procedure	No - for reference
EP-F2	Required action to be taken in the event of an Underground fire.	No - for reference
EP-F3	Electronic fire detection system – Responsibilities and duties of Personnel.	No - for reference
EP-F4	Emergency Procedure for a fire in battery charging Bays, stores, workshops, sub-stations, oil stores and Diesel bays.	No - for reference
EP-F5	Fire in Shaft or in Shaft Conveyance	No - for reference
EP- W 1	Flooding of Shaft Bottoms	No - for reference
EP- W 2	Intersection of Excessive Water	No - for reference
EP-EXP 1	Action to be taken in the event of a gas explosion	No - for reference

Annex VI

TYPE AND POSITION OF FIXED DETECTORS / EARLY WARNING SYSTEMS

TYPE	POSITION	AMOUNT
CARBON MONOXIDE		
FLAMMABLE GAS		
GEO PHONES		
MAIN FAN ALARM		
MAIN PUMPS		
ACCIDENT TO SHAFT ALARM (CALL BELL)		