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GOVERNMENT NOTICES • GOEWERMENTSKENNISGEWINGS

DEPARTMENT OF LABOUR

NO. R. 145

05 FEBRUARY 2016

LABOUR RELATIONS ACT, 1995**REGISTRATION OF A TRADE UNION**

I, Malixole Ntleki, Acting Registrar of Labour Relations, hereby notify, in terms of section 109(2) of the Labour Relations Act, 1995, that the **Democratic Municipal and Allied Workers' Union of South Africa LR2/6/2/2420** has been registered as a trade union with effect from 22/01/2016

**ACTING REGISTRAR OF LABOUR RELATIONS**22/01/2016

DEPARTMENT OF MINERAL RESOURCES

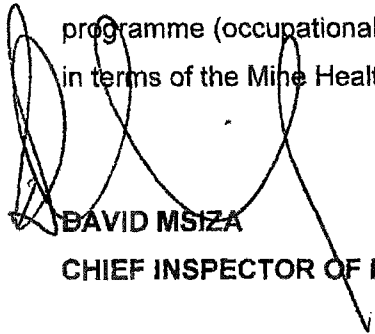
NO. R. 146

05 FEBRUARY 2016

MINE HEALTH AND SAFETY ACT, 1996 (ACT NO 29 OF 1996)

**GUIDELINE FOR A MANDATORY CODE OF PRACTICE FOR AN
OCCUPATIONAL HEALTH PROGRAMME (OCCUPATIONAL HYGIENE
AND MEDICAL SURVEILLANCE) ON THERMAL STRESS**

I **DAVID MSIZA**, Chief Inspector of Mines, under section 49 (6) of the Mine Health and Safety Act, 1996 (Act No. 29 of 1996) and after consultation with the Council, hereby issues the guideline for an occupational health programme (occupational hygiene and medical surveillance) on thermal stress in terms of the Mine Health and Safety Act, as set out in the Schedule.



DAVID MSIZA
CHIEF INSPECTOR OF MINES

SCHEDULE

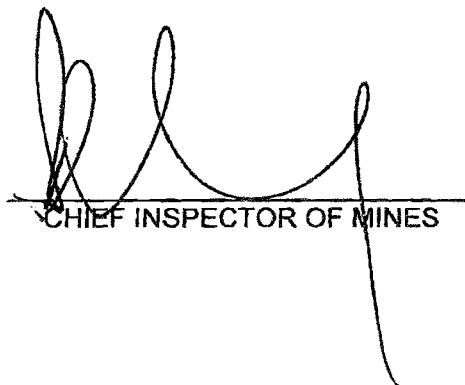
Reference Number: DMR 16/3/2/4-A2
Last Revision Date: 30 October 2015
Date First Issued: 01 February 2002
Effective Date: 01 July 2016

DEPARTMENT OF MINERAL RESOURCES

MINE HEALTH AND SAFETY INSPECTORATE

**GUIDELINE FOR THE COMPILATION OF A
MANDATORY CODE OF PRACTICE FOR**

**GUIDELINE FOR THE COMPILATION OF A MANDATORY CODE OF PRACTICE
FOR AN OCCUPATIONAL HEALTH PROGRAMME
(Occupational Hygiene and Medical Surveillance)
ON THERMAL STRESS**



CHIEF INSPECTOR OF MINES



mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

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PART A: THE GUIDELINE

1. FOREWORD

- 1.1 In an attempt to address matters affecting the health of workers in the mining industry, a Mine Health and Safety Council tripartite sub-committee was established under the auspices of the MOHAC. MOHAC found it necessary that in order to address these matters a guideline for a mandatory COP on thermal stress be drafted.
- 1.2 Significant risks to health exist in mining. In order to protect, monitor and promote employees' health status, an occupational health programme is required where exposure to such significant risks occurs. MOHAC considered it appropriate to prepare a guideline covering both occupational hygiene and medical surveillance to ensure compliance to the requirements of the MHS Act and to bring about uniformity of health standards.
- 1.3 Where the employer's risk assessment indicates a need to establish and maintain either a system of occupational hygiene measurements or a system of medical surveillance, or where either system is required by regulation, the employer must prepare and implement a COP based on this guideline.
- 1.4 Thermal stress management is a multifaceted approach to promote worker health and safety through minimising human thermal stress and the incidence of heat or cold disorders.
- 1.5 Occupational thermal exposure is a health and safety hazard of no uncertain dimensions and, typically, has to be dealt with through strategies which embrace environmental engineering, administrative controls and personal protection. This scenario finds application in most South African mines and associated surface operations. The fundamental perspective to retain, however, is that source control through engineering means represents the primary strategy, irrespective of the hazard in question (see paragraph 7.1, Part C, page 10). Conversely, personal protection is not a convenient alternative to source control; at best it merely serves as an interim cost effective expedient.
- 1.6 When categorising the thermal environment as required by the guideline, regard must be had to the SAMOHP issued by the DMR.
- 1.7 This guideline assists employers with the establishment of an Occupational Health Programme, but does not stipulate specific requirements for specific circumstances. It sets out a basic system for managing risk to health. The first component of any management system is finding out **what the situation**, secondly deciding **what to do about it**.

2. LEGAL STATUS OF GUIDELINES AND CODES OF PRACTICE

- 2.1. In accordance with section 9(2) of the MHS Act 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 mines 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)).

3. THE OBJECTIVES 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 protect and improve the health of employees at the mine by monitoring and reducing their exposure to thermal stress. It provides guidance of a general nature on the required format and content for the COP and details sufficient technical background to enable the drafting committee at the mine to prepare a comprehensive and practical COP for their mine.

It sets out the two components of an Occupational Health programme namely:

3.1.1 Occupational Hygiene

3.1.2 Medical Surveillance

3.2. Where an employer is required in terms of regulation 9.2(2) or in terms of risk assessment, to establish and maintain a system of occupational hygiene measurements in respect of thermal stress, this guideline should assist the employer in doing so.

4. DEFINITIONS AND ACRONYMS

'abnormally hot environment'

- means any environment where $DB > 37,0^{\circ}C$ and/or $WB > 32,5^{\circ}C$ (For underground Operations)
- means the time weighted average WBGT Index , determined over a period of one hour, exceeding 30 in the environment in which an employee works .(For surface Operations)

'COP' means Code of Practice.

'CSM' means Cold Stress Management.

'DMR' means the Department of Mineral Resources.

'DB' means Dry-bulb temperature.

'GT' means globe temperature (Radiant heat)

'hot environment' means any environment where $DB < 37,0^{\circ}C$, Globe temperature $< 37,0^{\circ}C$, a WB range of 27,5 - 32,5 $^{\circ}C$ inclusive.

'HSM' means Heat stress management.

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

'MHSC' means Mine Health and Safety Council.

'MOHAC' means Mining Occupational Health Advisory Committee.

'NIOSH' means the United States National Institute for Occupational Safety and Health.

'OEL' means Occupational Exposure Limit.

'OMP' means Occupational Medical Practitioner.

ON SITE means in the vicinity of where the mine is situated.

'RADIANT HEAT' means the electromagnetic transfer of heat energy without direct contact;

'SAMOHP' means the South African Mines Occupational Hygiene Programme Codebook.

'SIMRAC' means Safety In Mines Research Advisory Committee.

'WB' means Wet-bulb Temperature.

'WBGT Index' means a number which characterises the thermal conditions in the environment to which that number applies.

5. SCOPE

- 5.1 A COP for an occupational health programme on personal exposure to thermal stress must be prepared, in compliance with this guideline, and implemented in terms of Regulation 9.2(2), which requires that a system of occupational hygiene measurements on personal exposure to thermal stress must be prepared and implemented when the results of the risk assessment conducted has identified that the following limits prevail:
- Heat >25,0°C wet bulb and/or >32,0°C dry bulb and/or 32,0°C radiant temperature (monitoring level)
 - Cold <10°C equivalent chill temperature (monitoring level)
- 5.2 This guideline covers a basic Occupational Health Programme for the purpose of measuring occupational exposures to thermal stress and the linking of these exposures to employee medical records.
- 5.3 The Occupational Health Programme should through monitoring identify employees with significant exposures and, where necessary, should provide for the implementation of control measures. This guideline does not stipulate the control measures but only the hierarchy to be followed to control exposures.

- 5.4 Formal data returns on exposure levels will be used to establish and maintain an industry exposure database.

6. MEMBERS OF THE TASK COMMITTEE

The following members of the Sub-committees have prepared the original document.

6.1 Occupational Hygiene Sub-committee

STATE	EMPLOYEES	EMPLOYERS
B A Doyle - Chairperson	D R Beukes	G Janse van Rensburg
R H McIntyre		A J Kielblock
M R Motlhamme		H Moorcroft
D Rowe		D Stanton
		E Steyn
		D E Wrigley

6.2 Occupational Medicine Sub-committee

STATE	EMPLOYEES	EMPLOYERS
E M Ohaju	W Mboniso	D Barnes
DVP Mathibeli	N White	R Dowdeswell
A van der Merwe		R Guild
		M A C La Grange
		S Shearer

6.3 The following persons /private

H Rex	Anglo Gold
S Schutte	CSIR Mining Tech

6.4 The following members have reviewed the original document.

Review Team

STATE	EMPLOYEES	EMPLOYERS
Occupational Hygiene Sub-committee		
MP Huma (Chairperson)	H.van Vuuren	M Beukes
T.Motitimi	E Gcilitshana	J Du Plessis
J.Legadima		MJ Mepha
Occupational Medicine Sub-committee		
D Mokoboto	H.van Vuuren	DB De Villiers
A van der Merwe	E Gcilitshana	Z Ellof

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-
 - (a) 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
 - (b) 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 CODE OF PRACTICE**1. TITLE PAGE**

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

- 1.1 Name of mine;
- 1.2 The heading: "Mandatory Code of Practice for an Occupational Health Programme on Thermal Stress";
- 1.3. A statement to the effect that the COP was drawn up in accordance with guideline Department of Mineral Resources Reference Number DMR 16/3/2/4-A2 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 COP

This section must contain statements to the effect that:

- 3.1 The COP was drawn up in accordance with Guideline DMR 16/3/2/4-A2 of the Department of Mineral Resources issued by the Chief Inspector of Mines.
- 3.2 This is a mandatory COP in terms of sections 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 method 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 sources of thermal stress.
- 5.4 The general ventilation arrangements and/or cooling arrangements.
- 5.5 Other related COPs and management standards must be reviewed concurrently in order to avoid conflict of requirements as laid down by the mine. The objective would be to have an integrated system.
- 5.6. The unique features of the mine that have a bearing on this COP and cross-reference them 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 MHS Act 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 risk assessed. The employer must determine 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.
- 7.2. To assist the employer with the risk assessment all possible relevant information such as accident statistics, ergonomic studies, research reports, manufacturers specifications, approvals, design criteria and performance figure for all relevant equipment should be obtained and 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 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.

8. ASPECTS TO BE ADDRESSED IN THE COP

Where the employer's risk assessment indicates a need to establish and maintain either a system of occupational hygiene measurements or a system of medical surveillance, or where either such system is required by regulation, the following key elements must be addressed in the COP:

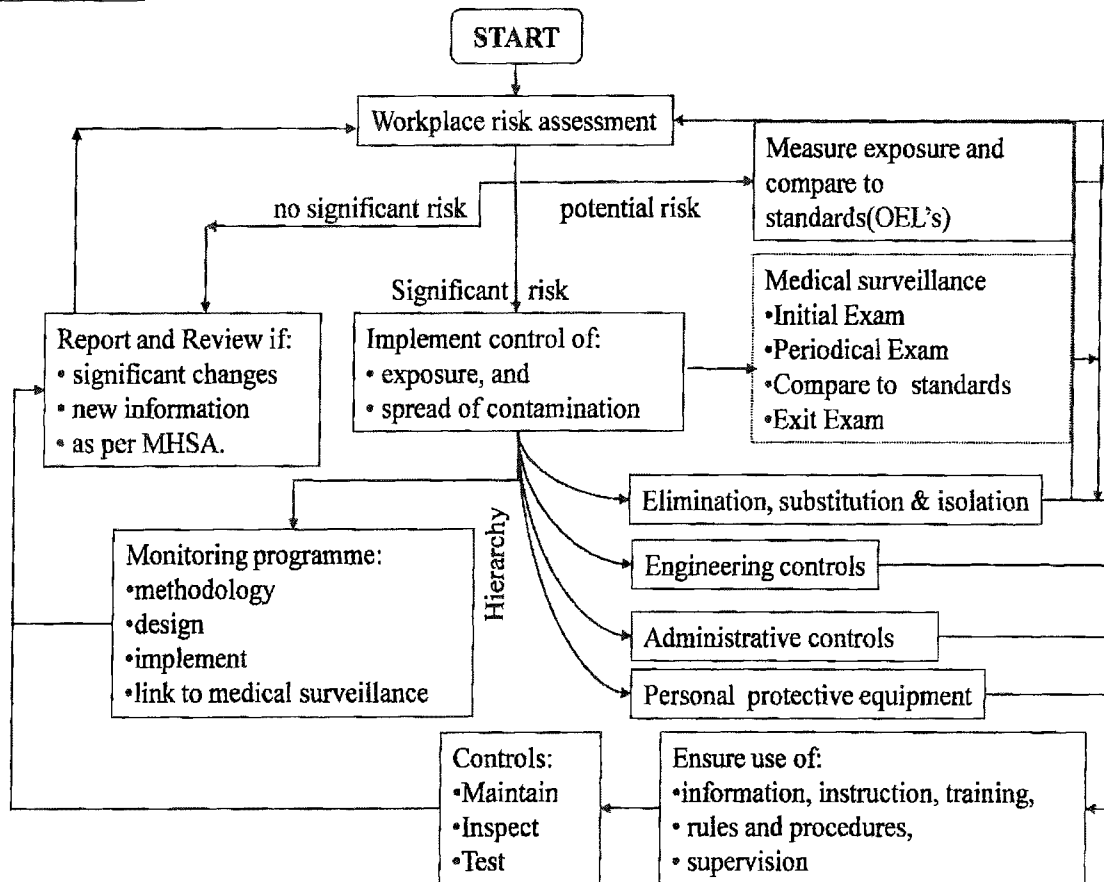
- Risk assessment and control.
- Monitoring programme.
- Hierarchy of controls.
- Medical surveillance.
- Reporting and reviewing.

These key elements are shown in Figure 1 below.

The Occupational Health Programme to be implemented on the mine must be summarised in the COP in a flow chart similar to Figure 1

FIGURE 1

OCCUPATIONAL HEALTH PROGRAMME



The Occupational Health Programme has two components namely:

- Occupational Hygiene; and
- Medical Surveillance.

8.1 OCCUPATIONAL HYGIENE PROGRAMME

The employer must ensure that when undertaking an Occupational Hygiene Programme the following steps are included:

- Step 1: Risk Assessment and Control
- Step 2: Categorisation of the Thermal Environments
- Step 3: Thermal Stress Management (i.e. heat stress and/or cold stress management)
- Step 4: Measurement Methodology
- Step 5: Thermal Stress Monitoring
- Step 6: Reporting and Recording

For the purpose of this guideline thermal stress will be dealt with in two separate parts, namely:

Note:**PART 1:** HEAT STRESS (Paragraph 8.1.1)**PART 2:** COLD STRESS (Paragraph 8.1.2)

Steps 1-5 are covered separately in each part.

Step 6, paragraph 8.1.3 applies to both parts.

8.1.1 PART 1: HEAT STRESS**8.1.1.1 Risk assessment and control**

The COP must address the following points:

- (a) The risk assessment process used must be described.

Note:*Where the available historical data is insufficient to enable professional judgement regarding the extent of any risk, acceptable methodologies e.g. such as stipulated by NIOSH or BRITISH STANDARDS BS EN 689 should be used.**Other reference material that could be used is:-*

- International Organisation for standardization ISO 7243
- Analytical method for assessing and controlling hot environments based upon the wet bulb globe temperature (WBGT)_index ISO 7933

- (b) The activity areas must be described (see SAMOHP, Part A, section 2.2.2, Step 2) with reference to the:
- (i) Significant sources of heat stress to which employees are being exposed and would influence the environmental thermal load, e.g. geothermal gradient and rock temperature, machinery, high humidity, high radiant heat (see Annexure 2. Annexure 2 is for information only), auto compression, rate of work (strenuous work), restricted and inclined work areas etc., which have been identified, in the Activity Area;
 - (ii) Health effects associated with exposure to heat stresses (high environmental heat loads and radiant temperature);
 - (iii) Limits for each relevant parameter of the environmental thermal load on the mine e.g.
 - Wet-bulb temperature in °C
 - Dry-bulb temperature in °C
 - radiant temperature (Globe temperature) in °C
 - Velocity in m/s (stopping and general ventilation)
 - Air volume per square meter of face in m³/s (development)
 - Indices (discomfort index, effective temperature; wet bulb globe temperature, etc)
 - (iv) Nature of the key workplace operations and activities that pose the greatest potential for exposure heat stress;
 - (v) Occupations and number of employees who are being exposed to heat stress;
 - (vi) Pattern, i.e. intermittent, continuous etc., duration and frequency of employee exposure to heat stress;

- (vii) The actual exposure levels measured compared to occupational exposure limits;
- (viii) Control measures in place, i.e. substitution, engineering, administration, personal protective equipment etc., the additional control measures required to be instituted in order to reduce or maintain exposures to below the occupational exposure limits, and if applicable the planned programme of implementation; and
- (ix) Frequency of any ongoing monitoring to assess the effectiveness of the controls mentioned above.

8.1.1.2 Categorisation of the thermal environment

- (a) The thermal environment must be categorised for the purposes of monitoring

Note:

Paragraph 2.2.2 of the SAMOHP sets out the sequential methodology to be used for the categorisation of the thermal environment. This methodology includes the following:

- Step 1: Subdivide the mine into measurement areas;
 - Step 2: Subdivide the measurement areas into activity areas;
 - Step 3: Evaluate the risk assessment undertaken;
 - Step 4: Subject the data to an elementary but statistical analysis in order to categorise each defined activity area with a degree of confidence commensurate with the risk;
 - Step 5: (Optional) - depending on specific circumstances, needs or operations, mines may opt to implement heat stress management in terms of a heat stress index.
- (b) The categorisation of the thermal environment must be clearly demarcated on a plan/sketch.
 - (c) The thermal environment must be reclassified when there is a need.
 - (d) Thermal environments must be re-assessed when inter-alia the following occur:
 - (i) Exposure levels change due to controls being initiated and likewise when controls deteriorate;
 - (ii) Employee complaints are received;
 - (iii) Processes are changed (e.g. change in procedures, mining and ventilation layouts, mining methods, plant, equipment or material);
 - (iv) Occupational illness occurs;
 - (v) Change in exposure category occurs; and
 - (vi) Other events warranting re-evaluation e.g. new regulatory initiatives.

Note:

This re-classification must only be done if results are proven and consistent. The monitoring strategy within that thermal environment must adopt to the new frequency of monitoring when either of the above occurs (i.e. 8.1.1.2 c and d).

8.1.1.3 Heat stress management (HSM)

- (a) The COP must require a heat stress management programme to be implemented where the risk assessment determines a significant risk (i.e. category A, B and C, step 4, see SAMOHP). The following criteria must be addressed in this Thermal Stress Code of Practice and or cross referenced to the standard operating procedure addressing this programme:
- (i) Structural Organisation for Heat Stress Management (see Annex 4);
 - (ii) Medical/Physical Examinations (see Annexure 5);
 - (iii) Heat Tolerance Screening (see Annexure 6);
 - (iv) Work Practices: Surface Opencast and Underground Operations (see Annexure 7);
 - (v) Absenteeism (see Annexure 8);
 - (vi) Water and Nutritional Requirements During Work in Heat (see Annex 9); and
 - (vii) Emergency Work (see Annexure 10).

Note:

The above annexes are extracts from the SIMRAC Project Report GAP 505, and are included for information purposes. It is further recommended that the project report be consulted in its entirety for more background information pertaining to this stress.

8.1.1.4 Measurement methodology

- (a) The COP must require a data sheet to be drawn up and kept on record by the mine for each parameter of the environmental thermal load. Points to be addressed in this data sheet should include inter-alia the following:
- (i) The instrument used;
 - (ii) Specification/accuracy;
 - (iii) Calibration/ certification;
 - (iv) Methodology (base-line survey and environmental monitoring); and
 - (v) Data recording format.

8.1.1.5 Heat stress monitoring

Monitoring is to be conducted on an annual cycle period in compliance with Regulation 9.2(7).

Note:

The category of the thermal environment in which persons are working must be allocated to all employees within that thermal measurement area

(a) Formal Monitoring Period

Thermal monitoring for heat stress is to be conducted during the warmest quarter in the weather cycle, determined by the risk assessment. (Generally for surface operations this will be for the

quarters - October to December and January to March). Underground operations monitoring should be conducted in accordance with the risk assessment.

Note:

The employer must ensure that in defining any particular thermal environment, the precautions listed below are heeded.

- (i) Care should be exercised to detect trends where the thermal environment changes, especially from 'cool' to 'hot', or from 'hot' to 'abnormally hot'. Regular monitoring is clearly indicated, even if only on a random basis, and 'cool' environments should not be excluded, especially when marginal. The specific protocol would be dictated by prevailing circumstances, and, therefore, cannot be stipulated or prescribed;
 - (ii) Seasonal drifts could be crucial and to rely on winter temperatures may lead to an underestimation of the risk and visa versa. Environmental monitoring should take this into account.
- (b) The employer must consider the following points with regards to workplace monitoring:
- (i) For the purpose of defining the thermal environment from a Heat Stress Management point of view, dry- and wet-bulb, and globe temperatures, using a whirling hygrometer, or any other suitable instrumentation, may be used. This information may be extracted from existing, and continually updated, databases. Regular monitoring, even on a daily basis, is recommended under certain circumstances.
 - The primary purpose of workplace monitoring is to verify the findings of the base-line survey, i.e. that environmental conditions still fall within the ranges applicable to the environmental heat load category (A, B, C or D) assigned to a particular workplace. In this regard, **workplace monitoring represents a review of the base-line survey** and, as such, provides input to the following base-line survey (to be carried out a year later).
 - Workplace monitoring should be sufficiently sensitive to detect changes or trends in the thermal environment so that significant changes in the environmental thermal load can be detected timeously and dealt with in a pro-active manner, if at all possible. By 'significant' is meant that the environmental thermal load category is likely to or has changed. Of course, upward drifts are more critical in this regard.

- (ii) For the monitoring programme to be effective it should be developed in house within the following framework:-

Routine monitoring: All areas of work should be monitored in terms of the most relevant parameter of the prevailing thermal environment (e.g. wet bulb temperature) that is periodically done in accordance to the Heg classification as stipulated in step 4, paragraph 2.2.2 of the SAMOHP Code book.

Adjusted monitoring: Where prevailing conditions are close to upper limits (e.g. within the range of 1 to 2°C dry or wet bulb) or where trends are discernible, the frequency of monitoring must be increased in accordance to the risk in order to manage the risk on a day to day basis.

- (iii) The procedures to ensure that the above workplace-monitoring programme is adhered to must be described in the Code of Practice. Where corrective actions are necessitated, this information should also be logged in the workplace record.
- (iv) In the event those thermal environments change significantly (i.e. a change of category takes place), two main scenarios exist.
- Firstly, the change could be of a temporary nature but if the category changes for the worse and employees are exposed, irrespective of personal consequences, the mine should undertake a formal investigation and record its findings. Such overexposures should be recorded on affected employees' medical records if overt indications of heat illness or disorders occur. In the event of incidents of heat exhaustion and/ or heat stroke, the DMR must be informed officially as required by the existing SAMRASS reporting system.
 - Secondly, where such changes are permanent, e.g. as a result of improved ventilation/cooling practices or as a result of operational dictates, **the base-line survey should be updated on a quarterly basis.** The format of the report is the same, irrespective of whether or not such changes are permanent or temporary. (Shifts in environmental heat loads within a given category do not have to be reported.)

8.1.2 PART 2: COLD STRESS

8.1.2.1 Risk assessment and control

The COP must address the following points:

- (a) The risk assessment process used must be described.

Note:

Where the available historical data is insufficient to enable professional judgement, acceptable methodologies e.g. such as stipulated in NIOSH or British Standard BS En 689 should be used.

Other reference material that could be used is:

- *Method of assessing thermal stress associated with exposure to cold environments ISO11079:2007*

- (b) The activity areas must be described (see SAMOHP, Part A, section 2.2.3) with reference to:
- (i) The significant sources of cold stress, to which employees are being exposed and would influence the environmental thermal load, e.g. air temperature, wind velocity, refrigerator rooms, etc which have been identified in the Activity Area;
 - (ii) The health effects associated with exposure to cold stress;
 - (iii) The limits for each relevant parameter of the environmental thermal load on the mine, e.g.:
 - Drybulb temperature in °C;
 - Equivalent chill temperature in °C;
 - (iv) The nature of key workplace operations and activities that pose the greatest potential for exposure to cold stress;
 - (v) The occupations and number of employees which are being exposed to cold stress;
 - (vi) The pattern, i.e. intermittent, continuous etc., duration and frequency of employee exposure to cold stress;
 - (vii) The actual exposure levels measured compared to occupational exposure limits;
 - (viii) The control measures in place, i.e. substitution, engineering, administration, personal protective equipment etc., the additional control measures required to be instituted in order to reduce or maintain exposures to below the occupational exposure limits, and if applicable the planned programme of implementation; and
 - (ix) The frequency of any ongoing monitoring to assess the effectiveness of the controls mentioned above.

8.1.2.2 Categorisation of the thermal environment

- (a) The thermal environment must be categorised for the purpose of monitoring. The COP must address the following Points:

Note:

Paragraph 2.2.3 of the SAMOHP sets out the sequential methodology to be used for the categorisation of the thermal environment. This methodology includes the following:

- Step 1: Subdivide the mine into measurement areas;
 - Step 2: Subdivide the measurement areas into activity areas;
 - Step 3: Evaluate the risk assessment undertaken;
 - Step 4: Subject the data to an elementary but statistical analysis in order to categorise each defined activity area with a degree of confidence commensurate with the risk.
- (b) The thermal categorisation of these thermal environments must be clearly demarcated on a plan/sketch.

- (c) The thermal environment must be reclassified when there is a need.
- (d) Thermal environments must be re-assessed when inter-alia the following occur:
 - (i) Exposure levels change due to controls being initiated and likewise when controls deteriorate; (ii) employee complaints are received;
 - (iii) Processes are changed (e.g. change in procedures, mining and ventilation layouts, mining methods, plant, equipment or material);
 - (iv) Occupational illness occurs;
 - (v) A change in exposure category occurs; and
 - (vi) Other events warranting re-evaluation, e.g. new regulatory initiatives.

Note:

Any re-classification must only be done once results are proven and consistent. The monitoring strategy within that thermal environment must adopt to the new frequency of monitoring when either of the above occurs.

8.1.2.3 Cold stress management (CSM)

- (a) The COP must require a cold stress management programme to be implemented where the risk assessment determines a significant risk (i.e. categories A and B, see SAMOHP, step 4). The following points must be addressed in this Code of Practice and or cross referenced to the standard operating procedure addressing this criteria:
 - (i) Structural Organisation;
 - (ii) Medical/physical examinations;
 - (iii) Safe Work Practices and Supervision:
Strategy for dealing with cold environments;
 - (iv) Precautions to prevent cold stress e.g. personal protective equipment; and
 - (v) Emergency work

Note:

*Annex 3 should be consulted when drawing up this management programme.
Annex 3 is for information only.*

8.1.2.4 Measurement methodology (for cold stress)

The COP must require a data sheet to be drawn up and kept on record by the mine for each parameter of the environmental thermal load. Points to be addressed in this data sheet should include inter-alia the following:

- (a) The instrument used;
- (b) Specification/accuracy;
- (c) Calibration/ certification;
- (d) Methodology (base-line survey & environmental monitoring); and
- (e) Data recording format.

8.1.2.5 Cold stress monitoring

Monitoring is to be conducted on an annual cycle period in compliance with Regulation 9.2(7). Accurate meaningful results, which are representative of all full working shifts for that thermal environment, are obtained from this monitoring.

Note:

The category of the thermal environment in which persons are working must be allocated to all employees within that thermal measurement area.

For the purpose of defining the thermal environment from a Cold Stress Management point of view, dry-bulb temperatures and velocity, using any suitable instrumentation, may be used. This information may be extracted from existing, and continually updated, data bases. Regular monitoring, even on a daily basis, is recommended under certain circumstances.

(a) Formal Monitoring Period

Thermal monitoring for cold stress is to be conducted during the coldest quarter, as determined during the risk assessment. (Generally for Cold Stress: Quarter – April to June and July to September)

Note:

In defining any particular thermal environment, the precautions listed below should be heeded.

Care should be exercised to detect trends where the thermal environment changes, especially from 'cool' to 'cold'. Regular monitoring is clearly indicated, even if only on a random basis, and 'cool' environments should not be excluded, especially when marginal. The specific protocol would be dictated by prevailing circumstances, and, therefore, cannot be stipulated or prescribed,

8.1.3 REPORTING AND RECORDING

The COP must address the following points:

8.1.3.1 Occupational Hygiene measurement records (records to be kept by the employer on site)

The record keeping system to be kept for a minimum of five years, should inter-alia include information on the following?

(a) Reasons for any change of category in the thermal environment

- (i) Controls not operating effectively;
- (ii) Events or factors which have influenced the results; e.g. refrigeration plants not operating;
- (iii) Ongoing monitoring;

- (iv) Standard operating procedures;
- (v) Control measures in place; and
- (vi) Future plans (hierarchy of controls).

(b) Hierarchy of Controls initiated (describe method used i.e.)

- (i) Elimination
 - Innovation (remote control)
- (ii) Engineering controls at source:
 - Dilute with ventilation;
 - Cooling installations;
 - Radiation barriers, etc.
- (iii) Administrative controls:
 - Self pacing to prevent fatigue;
 - Safe systems of work;
 - Reducing exposure time (work rest cycles);
 - Drinking rules for employees, etc.
- (iv) Personal protective equipment (PPE)
 - Body cooling garments, etc.

Note:

Regulation 9.2(7) pertains to annual personal exposure mandatory reports which are required to be submitted to the regional principal inspector of mines.

8.2 OCCUPATIONAL MEDICAL SURVEILLANCE

The COP must address the following points:

8.2.1 OCCUPATIONAL MEDICAL SURVEILLANCE PROGRAMME

- 8.2.1.1 The medical surveillance programme required either in terms of the risk assessment process or if required in terms of chapter 11 of the MHSA regulations must be described.
- 8.2.1.2 The method used to link monitoring and the hygiene register to medical records as required in terms of section 12(3) of the MHSA must be described.

Note:

A manual or computerised system can be utilised whereby this information is transferred. These systems may have to be customised in accordance with the operations specific needs or commercial programs can be acquired to perform this task. Effective communication between the Occupational Hygiene Practitioner and the Occupational Medical Practitioner is required to ensure

that exposure history and medical manifestation of systems are meaningful.

- 8.2.1.3 Categories of medical examinations at which medical surveillance may be carried out

A procedure describing how the following examinations required by the MHSa will be conducted at the mine:

- (a) **Initial examination** - in terms of section 13(2) (c) of the MHSa;
- (b) **Periodic examination** - in terms of section 13(2) (c) of the MHSa;
- (c) **Exit examination** - in terms of sections 17 and 19(2) of the MHSa.

8.2.2 METHODOLOGICAL STANDARDS FOR TEST TECHNIQUES FORMING PART OF MEDICAL SURVEILLANCE

- 8.2.2.1 The methodology used to comply with the legal requirements in respect of medical surveillance stipulated in Section 13(2) of the MHSa, must be described in the COP.

Note:

The employer must ensure that for routine work, the anticipated work environment must be categorised as follows:

- (a) For heat as (refer to Codebook paragraph 2.2.2 step 4 para 4):
 - (i) Category A;
 - (ii) Category B;
 - (iii) Category C; and
 - (iv) Category D.

Occupational exposures are derived from the base-line survey;

- (b) And for cold as (refer to Codebook paragraph 2.2.3 step 4 point 3):
 - (v) Category A;
 - (vi) Category B;
 - (vii) Category C.

- 8.2.2.2 The procedure must be described to ensure that the above information is available to the occupational medical practitioner.

Note:

Heat and Cold disorders can occur and do occur in thermal environments without any significant change in environmental thermal load. Whenever such incidents occur, immediate and full investigations should take place, the primary purpose being to:

- (a) *prevent the recurrence of such incidents, and by collating such data,*
- (b) *provide input to Heat Stress Management or Cold Stress Management programme review.*

8.2.2.3 The protocol for employee monitoring must be described.

Note:

The protocol should be developed on the basis of the framework proposed in Annexure 5, Section 1.3 "Heat as a Health and Safety Hazard: Information Base for Risk Assessment". Annex 5 is for information only. Employee monitoring also provides input to medical surveillance and, consequently, these elements should be fully integrated. For work in an abnormally hot environment, fitness will be based on

(a) A satisfactory risk profile as determined by previous medical examinations; and

(b) The prevailing medical status and as determined by a special screening test.

Further guidance is provided in Annex 10 "Emergency Work in Abnormally 'Hot' Environments". Annex 10 is for information only.

8.2.2.4 The procedure in force where work in 'abnormally hot' environments is to be undertaken must be described.

Note:

Any adverse consequences, as a result of such exposures, should be entered on the employee's medical record.

8.2.3 MEDICAL SURVEILLANCE ACCORDING TO HEALTH HAZARD

8.2.3.1 A system of medical surveillance that combines the requirements of medical surveillance for different hazards in such a way that these requirements are met effectively and efficiently, must be developed.

Note:

Frequently, employees are exposed to more than one hazard requiring medical surveillance. The medical surveillance in respect of each hazard should be done in parallel, and the mine's system of medical surveillance should be designed to avoid duplication. A single, similar test could suffice for the medical surveillance of more than one hazard. It could therefore be possible to use the same examination or test for the medical surveillance of more than one hazard, provided that the requirements of medical surveillance for each hazard are achieved.

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 The employer must ensure that 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, is 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.
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ANNEXURE 1: Reference documents*(For information only)*

1. The Mine Ventilation Practitioner's Data Book (1992). Section: Heat Stress. Topic: Stress
2. 'American Conference of Government Industrial Hygienists' Booklet TLVs and BEIs
3. SIMGAP 505
4. MHSC Handbook on Mine Occupational Hygiene Measurements Chapter 18 (thermal Environment)
5. Handbook in Environmental Engineering (published by Mine Ventilation Society of South Africa, as amended); Chapter 20 (Heat stress: origins and consequences) and Chapter 21 (Heat stress Management).

ANNEXURE 2*(For information only)***1. RADIANT TEMPERATURE**

Radiation is the electromagnetic transfer of heat energy without direct contact. Radiant heating from the sun provides the best illustration. Despite the vacuum of space, sunlight strikes the earth's surface and is both absorbed and reflected, producing heat. Workers in hot environments exposed to high radiant loads will benefit from shielding. This, of course, explains the appeal of shade to those labouring in the sun. It is important to recognise that all objects radiate to other objects, thus the total thermal radiation to which a worker is exposed is the sum of all direct and indirect (reflected) radiation, minus the worker's radiation to cooler objects. For simplicity, when the radiant temperature is above about 35°C (a common skin temperature during work in hot environments), the body will gain heat, whereas below 35°C, the body loses heat through radiation

Where radiant heat poses a potential problem, assessments must be conducted by means of a globe thermometer. Temperatures in excess of 37°C should be regarded as an upper limit for sustained physical work and engineering controls must be invoked at this stage. Examples of how to control radiant heat include:

- Radiant heat shielding,
- Reduction of the temperature of the primary radiating surfaces,
- Protective garments, and
- General design features.

For most people the pain threshold for an elevated skin temperature is 45°C.

Finally, while most heat stress indices embrace radiant temperature, such indices must not be implemented unless under the direction of a recognised and experienced occupational hygienist.

1.1 Wet-bulb Globe Temperature (WBGT)

WBGT is calculated by adding seven tenths of the reading in degrees Celsius obtained with a naturally ventilated wet bulb thermometer to one fifth of the reading in degrees Celsius obtained with a globe thermometer and adding that sum to one tenth of the reading in degrees Celsius obtained with a dry bulb thermometer.

The WBGT index requires knowledge of the natural wet-bulb temperature (t_{nwb}), the globe temperature (t_g), and the dry-bulb air temperature (t_a). The WBGT is calculated for indoor exposure, or outdoor exposure with no solar load.

$$WBGT = 0,7t_{nwb} + 0,3t_g$$

For outdoors sunlight exposure:

$$WBGT = 0,7t_{nwb} + 0,2t_g + 0,1t_a$$

1.2 Calculating the WBGT

Where the employee is continuously exposed to a hot environment, the environmental heat exposure is considered as a series of hourly time-weighted averages. Where the employee's exposure is intermittent (interrupted at least each 15 minutes by breaks spent in cool areas), the time weighting should be performance for periods of two hours.

For jobs in which heat exposure and effort are intermittent, the time-weighted average must be derived by recording the time spent at each task including rest periods, and the corresponding times spent in hot locations and in cooler locations during recovery.

The two-hour time-weighted average is calculated by the following equation:

$$\text{Average WBGT} = \frac{\text{WBGT}_1 \times (T_1) + \text{WBGT}_2 \times (T_2) + \dots + \text{WBGT}_n \times (T_n)}{(T_1) + (T_2) + \dots + (T_n)}$$

In the above equation, WBGT_1 , WBGT_2 , and WBGT_n , are measured values of WBGT for the various work and rest intervals during the total time period. T_1 , T_2 and T_n , is the duration of the respective intervals in minutes.

ANNEXURE 3

(For information only – abstract from ACGIH booklet)

COLD STRESS*Definitions and Acronyms***'Frostbite'**

Means the actual freezing of tissue. Any exposed skin is subject to frostbite when the air temperature is below zero or when wind speeds are high. Frostbite can lead to scarring, tissue damage, and possible amputation and may cause permanent disability. Symptoms of frostbite vary from swelling of the skin accompanied by slight pain in mild cases to tissue damage without pain or with burning pain or prickling in severe cases. Frostbitten skin is subject to infection and therefore must not be treated lightly. Affected area should be warmed slowly to normal temperatures. Medical attention should be received for severe cases.

'Hypothermia'

Means when the deep body or "core" temperature drops below 35°C. At this point the body loses its ability to prevent heat loss. The onset of hypothermia is a gradual process. Initially the victim has a sensation of cold, followed by pain. As exposure time or cold increase the sensation of pain is reduced and overall numbness develops. Additional symptoms include a decrease or absence of shivering, reduced memory and confusion, drowsiness, slurred speech, irritability, impaired co-ordination, dexterity and general muscular weakness. Hypothermia is a serious condition and can lead to coma and death if not treated quickly. Victims of mild hypothermia should be rewarmed in a warm bed or bath or with warming packs and blankets. Victims with severe hypothermia must receive immediate medical care from experienced medical personnel.

W/m² means Work rate in Watts expressed in terms of body surface area in square metres.

1. Introduction

Fatal exposures to cold among workers have almost always resulted from accidental exposures involving failure to escape from low environmental air temperatures or from immersion in low temperature water. The single most important aspect of life-threatening hypothermia is the fall in the deep core temperature of the body. The clinical presentations of victims of hypothermia are shown in Table 1. Workers should be protected from exposure to cold so that the deep core temperature does not fall below 36°C; lower body temperatures will very likely result in reduced mental alertness, reduction in rational decision making, or loss of consciousness with the threat of fatal consequences.

Pain in the extremities may be the first early warning of danger to cold stress. During exposure to cold, maximum severe shivering develops when the body temperature has fallen to 35°C. This must be taken as a sign of danger to the workers and exposure to cold should be immediately terminated for any workers when severe shivering becomes evident. Useful physical or mental work is limited when severe shivering occurs.

Since prolonged exposure to cold air or to immersion in cold water, at temperatures well above freezing can lead to dangerous hypothermia, whole body protection must be provided.

- (a) Adequate insulating dry clothing to maintain core temperatures above 36°C must be provided to workers if work is performed in air temperatures below -4°C. Wind chill cooling rate and the cooling power of air are critical factors. (Wind chill cooling rate is defined as heat loss from a body expressed in watts per meter squared which is a function of the air temperature and wind velocity upon the exposed body). The higher the wind speed and the lower the temperature in the work area, the greater the insulation value of the protective clothing required. An equivalent chill temperature chart relating the actual dry bulb air temperature and the wind velocity is presented in Table 2. The equivalent chill temperature should be used when estimating the combined cooling effect of wind and low air temperatures on exposed skin or when determining clothing insulation requirements to maintain the deep body core temperature.
- (b) Unless there are unusual or extenuating circumstances, cold injury to other than hands, feet, and head is not likely to occur without the development of the initial signs of hypothermia. Older workers or workers with circulatory problems require special precautionary protection against cold injury. The use of extra insulating clothing and/or a reduction in the duration of the exposure period are among the special precautions, which should be considered. The precautionary actions to be taken will depend upon the physical condition of the worker and should be determined with the advice of a physician with knowledge of the cold stress factors and the medical condition of the worker.

TABLE 1: Progressive clinical presentation of hypothermia

Core Temperature °C	Clinical Signs
37.6	"Normal" rectal temperature
37	"Normal" oral temperature
36	Metabolic rate increases in an attempt to compensate for heat loss
35	Maximum shivering
34	Victim conscious and responsive, with normal blood pressure
33	Severe hypothermia below this temperature
32 } 31 }	Consciousness clouded; blood pressure becomes difficult to obtain; pupils dilated but react to light;

	shivering ceases
30 } 29 }	Progressive loss of consciousness; muscular rigidity increase; pulse and blood pressure difficult to obtain; respiratory rate decreases
28	Ventricular fibrillation possible with myocardial irritability
27	Voluntary motion ceases; pupils nonreactive to light; deep tendon and superficial reflexes absent
26	Victim seldom conscious
25	Ventricular fibrillation may occur spontaneously
24	Pulmonary edema
22 } 21 }	Maximum risk of ventricular fibrillation
20	Cardiac standstill
18	Lowest accidental hypothermia victim to recover
17	Isoelectric electroencephalogram
9	Lowest artificially cooled hypothermia patient to recover

Presentations approximately related to core temperature. Reprinted from the January 1982 issue of American Family Physician, published by the American Academy of Family Physicians.

Presentations approximately related to core temperature. Reprinted from the January 1982 issue of American Family Physician, published by the American Academy of Family Physicians.

TABLE 2: Cooling power of wind on exposed flesh as equivalent temperature (under calm conditions)

Estimated Wind Speed (in kph)	Actual Temperature (°C)								
	4	- 1	- 7	- 12	- 18	- 23	- 29	- 34	- 40
0	4	- 1	- 7	- 12	- 18	- 23	- 29	- 34	- 40
8	3	- 3	- 9	- 14	- 21	- 26	- 32	- 38	- 44
16	- 2	- 9	- 16	- 23	- 30	- 35	- 43	- 50	- 57
24	- 6	- 13	- 20	- 28	- 36	- 43	- 50	- 58	- 65
32	- 8	- 16	- 23	- 32	- 39	- 47	- 55	- 63	- 71
40	- 9	- 18	- 26	- 34	- 42	- 51	- 59	- 67	- 76
48	- 16	- 19	- 22	- 36	- 44	- 53	- 62	- 70	- 78
56	- 11	- 20	- 29	- 37	- 46	- 55	- 63	- 72	- 81
64	- 12	- 21	- 29	- 38	- 47	- 56	- 65	- 73	- 82
Wind speed greater than 64 kph have little additional effect	LITTLE DANGER In < 1 hr with dry skin. Maximum danger of false sense of security			INCREASING DANGER Danger from freezing of exposed skin within 1 minute.			GREAT DANGER Flesh may freeze within 30 seconds.		

Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA.

Equivalent chill temperature requiring dry clothing to maintain core body temperature above 36°C per cold stress TLV.

2. Evaluation and control

For exposed skin, continuous exposure should not be permitted when the air speed and temperature results in an equivalent chill temperature of -32°C. Superficial or deep local tissue freezing will occur only at temperatures below -1°C regardless of wind speed.

At air temperatures of 2°C or less, it is imperative that workers who become immersed in water or whose clothing becomes wet be immediately provided a change of clothing and be treated for hypothermia.

TLVs recommended for properly clothed workers for periods of work at temperatures below freezing are shown in Table 3.

Special protection of the hands is required to maintain manual dexterity for the prevention of accidents:

- (a) If fine work is to be performed with bare hands for more than 10-20 minutes in an environment below 16°C, special provisions should be established for keeping the workers' hands warm. For this purpose, warm air jets, radiant heaters (fuel burner or electric radiator), or contact warm plates may be utilised. Metal handles of tools and control bars should be covered by thermal insulating material at temperatures below -1°C.
- (b) If the air temperature falls below 16°C for sedentary, 4°C for light, -7°C for moderate work, and fine manual dexterity is not required, then gloves should be used by the workers.

2.1 To prevent contact frostbite, the workers should wear anti-contact gloves.

- (a) When cold surfaces below -7°C are within reach, a warning should be given to each worker to prevent inadvertent contact by bare skin.
- (b) If the air temperature is -17.5°C or less, the hands should be protected by mittens.

Machine controls and tools for use in cold conditions should be designed so that they can be handled without removing the mittens.

2.2 Provisions for additional total body protection are required if work is performed in an environment at or below 4°C. The workers should wear cold protective clothing appropriate for the level of cold and physical activity:

- (a) If the air velocity at the job site is increased by wind, draft, or artificial ventilating equipment, the cooling effect of the wind should be reduced by

shielding the work area or by wearing an easily removable windbreak garment.

- (b) If only light work is involved and if the clothing on the worker may become wet on the job site, the outer layer of the clothing in use may be of a type impermeable to water. With more severe work under such conditions, the outer layer should be water repellent, and the outerwear should be changed, as it becomes wetted. The outer garments should include provisions for easy ventilation in order to prevent wetting of inner layers by sweat. If work is done at normal temperatures or in a hot environment before entering the cold area, the employee should make sure that clothing is not wet as a consequence of sweating. If clothing is wet, the employee should change into dry clothes before entering the cold area. The workers should change socks and any removable felt insoles at regular daily intervals or use vapour barrier boots. The optimal frequency of change should be determined empirically and will vary individually and according to the type of shoe worn and how much the individual's feet sweat.
- (c) If exposed areas of the body cannot be protected sufficiently to prevent sensation of excessive cold or frostbite, protective items should be supplied in auxiliary heated versions.
- (d) If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work should be modified or suspended until adequate clothing is made available or until weather conditions improve.
- (e) Workers handling evaporative liquid (gasoline, alcohol or cleaning fluids) at air temperatures below 4°C should take special precautions to avoid soaking of clothing or gloves with the liquids because of the added danger of cold injury due to evaporative cooling. Special note should be taken of the particularly acute effects of splashes of "cryogenic fluids" or those liquids with a boiling point that is just above ambient temperature.

3. Work-Warming Regimen

If work is performed continuously in the cold at an equivalent chill temperature (ECT) or below -7°C, heated warming shelters (tents, cabins, rest rooms, etc.) should be made available nearby. The workers should be encouraged to use these shelters at regular intervals, the frequency depending on the severity of the environmental exposure. The onset of heavy shivering, minor frostbite (frostnip), the feeling of excessive fatigue, drowsiness, irritability, or euphoria are indications for immediate return to the shelter. When entering the heated shelter, the outer layer of clothing should be removed and the remainder of the clothing loosened to permit sweat evaporation or a change of dry work clothing provided. A change of dry work clothing should be provided as necessary to prevent workers from returning to work with wet clothing. Dehydration, or the loss of body fluids, occurs insidiously in the cold environment and may increase the susceptibility of the worker to cold injury due to a significant change in blood flow to the extremities. Warm sweet drinks and soups should be provided at the work site to provide caloric intake and fluid volume. The intake of coffee should be limited because of the diuretic and circulatory effects.

For work practices at or below -12°C ECT, the following should apply:

- (a) The worker should be under constant protective observation (buddy system or supervision).
- (b) The work rate should not be so high as to cause heavy sweating that will result in wet clothing; if heavy work must be done, rest periods should be taken in heated shelters and opportunity for changing into dry clothing should be provided.
- (c) New employees should not be required to work full-time in the cold during the first days of employment until they become accustomed to the working conditions and required protective clothing.
- (d) The weight and bulkiness of clothing should be included in estimating the required work performance and weights to be lifted by the worker.
- (e) The work should be arranged in such a way that sitting still or standing still for long periods is minimised. Unprotected metal chair seats should not be used. The worker should be protected from drafts to the greatest extent possible.
- (f) The workers should be instructed in safety and health procedures.

The training program should include as a minimum instruction in:

- Proper rewarming procedures and appropriate first aid treatment.
- Proper clothing practices.
- Proper eating and drinking habits.
- Recognition of impending frostbite.
- Recognition of signs and symptoms of impending hypothermia or excessive cooling of the body even when shivering does not occur.
- Safe work practices.

TABLE 3: TLVs work / warm-up schedule for four-hour shift

Air Temperature °C (Sunny Skies)	No Noticeable Wind		8 kp/h Wind		16 kp/h Wind		24 kp/h Wind		32 kp/h Wind	
	Max. Work Period	No. Of Breaks	Max. Work Period	No. Of Breaks	Max. Work Period	No. Of Breaks	Max. Work Period	No. Of Breaks	Max. Work Period	No. Of Breaks
- 26 to – 28	Normal	1	Normal	1	75 mins.	2	55 mins.	3	40 mins.	4
- 29 to – 31	Normal	1	75 mins.	2	55 mins.	3	40 mins.	4	30 mins.	5
- 32 to – 34	75 mins.	2	55 mins.	3	40 mins.	4	30 mins.	5		
- 35 to – 37	55 mins.	3	40 mins.	4	30 mins.	5				
- 38 to – 39	40 mins.	4	30 mins.	5						
- 40 to – 42	30 mins.	5								
- 43 and below										

Notes for Table 3:

1. Schedule applies to any 4-hour work period with moderate to heavy work activity, with warm-up periods of ten (10) minutes in a warm location and with an extended break (e.g. lunch) at the end of the 4-hour work period in a warm location. For Light-to-Moderate Work (limited physical movement): apply the schedule one step lower. For example, at -35°C with no noticeable wind (step 4), a worker at a job with little physical movement should have a maximum work period of 40 minutes with 4 breaks in a 4-hour period (step 5).
2. If only the wind chill cooling rate is available, a rough rule of thumb for applying it rather than the temperature and wind velocity factors given above would be: (1) special warm-up breaks should be initiated at a wind chill cooling rate of about 1750 W/m²; (2) all non-emergency work should have ceased at or before a wind chill of 2250 W/m². In general, the warm-up schedule provided above slightly under-compensates for the wind at the warmer temperatures, assuming acclimatisation and clothing appropriate for winter work. On the other hand, the chart slightly over-compensates for the actual temperatures in the colder ranges because windy conditions rarely prevail at extremely low temperatures.
3. TLVs apply only for workers in dry clothing
4. Special Workplace Recommendations
 - 4.1 Special design requirements for refrigerator rooms include the following:
 - (a) In refrigerator rooms, the air velocity should be minimised as much as possible and should not exceed 1m/s at the job site. This can be achieved by properly designed air distribution systems.
 - (b) Special wind protective clothing should be provided based upon existing air velocities to which workers are exposed.

Special caution should be exercised when working with toxic substances and when workers are exposed to vibration. Cold exposure may require reduced exposure limits.

Eye protection for workers employed out-of-doors in a snow and/or ice-covered terrain should be supplied. Special safety goggles to protect against ultraviolet light and glare (which can produce temporary conjunctivitis and/or temporary loss of vision) and blowing ice crystals should be required when there is an expanse of snow coverage causing a potential eye exposure hazard.

Workplace monitoring is required as follows:

- (a) Suitable thermometry should be arranged at any workplace where the environmental temperature is below 16°C so that overall compliance with the requirements of the TLV can be maintained.
- (b) Whenever the air temperature at a workplace falls below -1°C, the dry bulb temperature should be measured and recorded at least every 4 hours.
- (c) In indoor workplaces, the wind speed should also be recorded at least every 4 hours whenever the rate of air movement exceeds 2 meters per second.
- (d) In outdoor work situations, the wind speed should be measured and recorded together with the air temperature whenever the air temperature is below -1°C.
- (e) The equivalent chill temperature should be obtained from Table 2 in all cases where air movement measurements are required: it should be recorded with the other data whenever the equivalent chill temperature is below -7°C.

Employees should be excluded from work in cold at -1°C or below if they are suffering from diseases or taking medication which interferes with normal body temperature regulation or reduces tolerance to work in cold environments.

Medication that may affect Thermoregulation

Many classes of drugs, whether prescribed, over-the-counter, recreational, homeopathic, traditional or illicit, can predispose their users to heat-related illnesses. Certain medication and/or substances can interfere with normal thermoregulatory function in multiple ways, mediated through:

- The hypothalamus, which sets normal body temperature;
- Heat perception, leading to behavioural change (heat avoidance);
- Changes in cardiac output; changes in peripheral vasodilatation;
- Changes in sweat rate;
- Changes due to renal function and/or body hydration.

In terms of direct heat effects, the most pharmacological consequence is via the impact on sweat rate. Certain medication and/or substances can act on nerve endings of the sweat glands.

Medical consultation is recommended where a candidate is using drugs or medication including but not limited to:

- Neuro- and psychotropic drugs, including recreational stimulants such as pseudo-amphetamines (e.g. Ecstasy),
- Antihistamines commonly used for colds and flu,
- Diuretics,
- Beta-blockers,
- Anti-epileptics,
- Anti-spasmodics for stomach cramps.

Workers who are routinely exposed to temperatures below -24°C with wind speeds less than eight kilometres per hour, or air temperatures below -18°C with wind speeds above 2.2m/s should be medically certified as suitable for such exposures

Trauma sustained in freezing or sub-zero conditions requires special attention because an injured worker is predisposed to cold injury. Special provisions should be made to prevent hypothermia and freezing of damaged tissues in addition to providing for first aid treatment.

5. Cold Stress Monitoring

5.1 Introduction

For surface operations it seems likely that the nature and extent of environmental temperature monitoring and the need to initiate/discontinue heat and cold stress management programmes will in many instances be determined by seasonal drifts.

A possible scenario is outlined below.

SEASON	AUTUMN	WINTER	SPRING	SUMMER
ACTIVITY	Discontinue HSM; monitor dry-bulb and air to determine equivalent chill factor	Implement CSM	Discontinue CSM; monitor dry-bulb and wet-bulb	Implement HSM

Although CSM and HSM are two distinct programmes, they remain linked through ongoing mandatory monitoring of the thermal environment. Central co-ordination is therefore essential.

In the interim Occupational Hygienists will be required to implement a monitoring programme in order to assess risk. The parameters in question are dry-bulb temperature and air speed for the determination of wind-chill factor (Regulation 9.2(2) and refer to ACGIH). A system of monitoring, including its derivation, is outlined below.

5.2 Basic considerations

The ACGIH interpretation of the equivalent chill temperature (ECT), converted to (C and approximated for convenience, is given below.

- > 5°C (ECT): No risk
- 5 to -30°C (ECT): Little danger for exposures of less than 1 hour
- < -30°C (ECT): Increasing danger; exposed flesh may freeze in one minute (final category omitted as being unrealistic for SA conditions)

An air speed of 8 km/h (about 2m/s) and above should be regarded as critical in changing the ECT from a 'No risk' to a 'Risk' category (ACGIH). Even at a dry-bulb temperature of 10°C, an air speed of 16 km/h (about 4,5 s) and above could depress the equivalent chill temperature to critical levels. Air speeds on excess of 65 km/h have little additional effect.

Holmer and co-workers (1998) make the following distinctions:

- < 18°C dry-bulb: 'cold'
- < -30°C (ECT): 'risk'

On the basis of the above considerations, the following monitoring system is proposed:

5.3 Proposed monitoring programme

- 5.3.1 Routine monitoring: Dry-bulb temperatures as supplied by the Weather Bureau (confirm relevance and accuracy) or any other direct measurement, if more applicable.
- 5.3.2 Dry-bulb < 18°C (as per Weather Bureau): measure and record dry-bulb temperatures representative of critical work stations (ACGIH: < 16°C).
- 5.3.3 Dry-bulb < 10°C: measure and record, in addition, air speed and convert to ECT (ACGIH: air speed commences at -1°C)

Actions:

- ECT > 5°C: No risk; maintain monitoring of ECT
- ECT 5°C but not -30°C: Implement formal CSM programme
- ECT -30°C: No-go; stop work/evacuate

5.4 Categorisation

An occupational hygiene measurement system must be established according to Regulation 9.2 and an annual report submitted to the DMR. This report is based on a categorisation of 'cold' working environments (SAMOHP Codebook).

Regulation 9.2(2) an occupational hygiene measurement system must be established (when): - cold: dry- bulb < 10°C.

The categorisation system for the purpose of compiling the annual DMR report is given below.

CATEGORY	TEMPERATURE RANGE	INTERPRETATION	GENERAL ACTION
A 'Abnormally cold'	≤ -30 °C	Severe risk (frost bite)	Stop work; evacuate
B 'Severe cold'	≤ 5 °C but not ≤ - 30 °C	Potential risk	Implement formal CSM ² ; no special

			precautions
C 'Cold'	> 5 °C	Negligible risk	Monitor equivalent chill temperature ³

- 1 Temperature ranges are given in terms of equivalent chill temperature (ACGIH)
- 2 CSM: Cold Stress Management
- 3 For categorisation purposes, thermal environments in excess of 10°C dry-bulb do not have to be reported

ANNEXURE 4*(For information only)***STRUCTURAL ORGANISATION FOR HEAT STRESS MANAGEMENT**

Definitions and acronyms

1. Introduction

By definition Heat Stress Management is based on multi-disciplinary inputs and control and it is proposed that overall control cannot be delegated but that it remains a management function. The multi-disciplinary nature of Heat Stress Management does, however, suggest the need for instituting some form of central co-ordination, a function which certainly can be delegated.

Heat Stress Management consists of two essential elements, namely:

- The detection of medical and physical contraindications for work in heat, as well as gross or permanent heat intolerance by means of appropriate screening procedures; and
- The natural progression of heat acclimatization on the basis of safe work practices.

An organizational framework for the control of Heat Stress Management is outlined in Figure 1.1. This should be viewed as a general guide which should be tailored to meet the particular requirements and organisational structure of each mine. The operational principle is that a system of regular review be instituted, for example on an annual basis. However, data acquisition and analysis should be sufficiently sensitive to identify untoward trends or incidents which would warrant immediate attention.

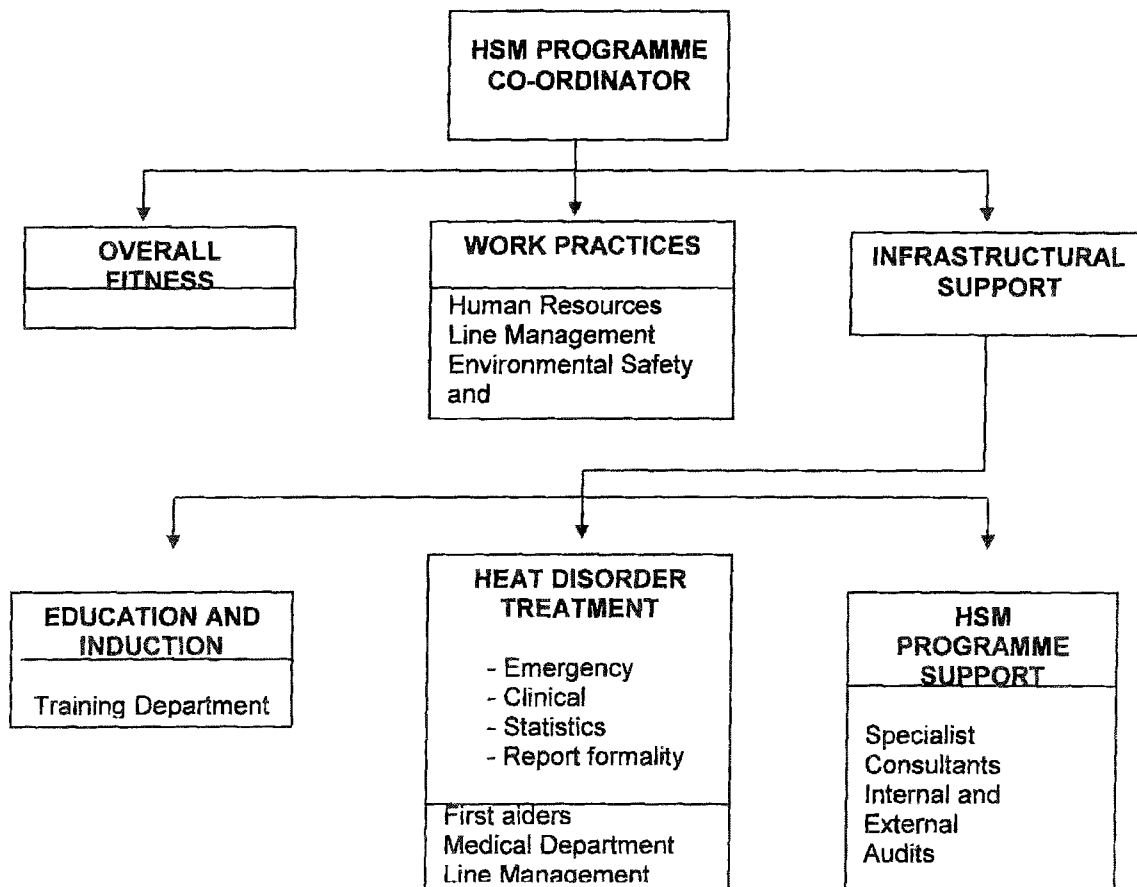
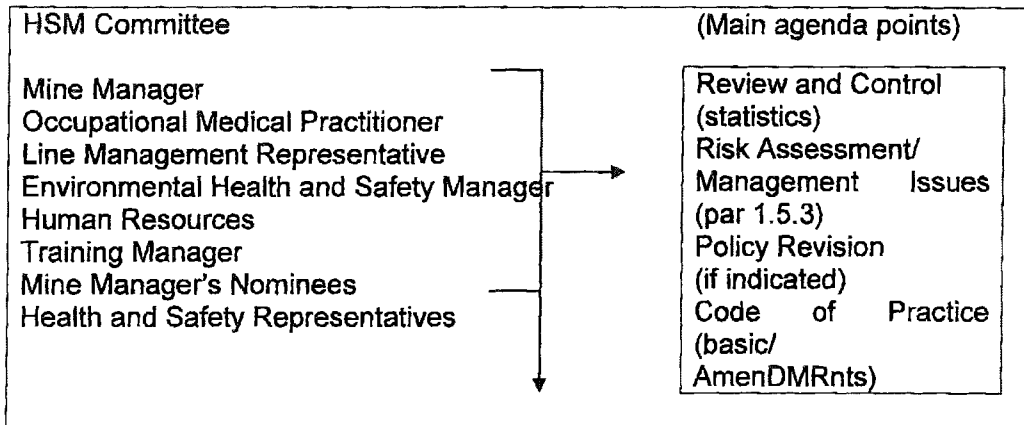
Establishing a structural organization is seen as an essential first step in the implementation process.

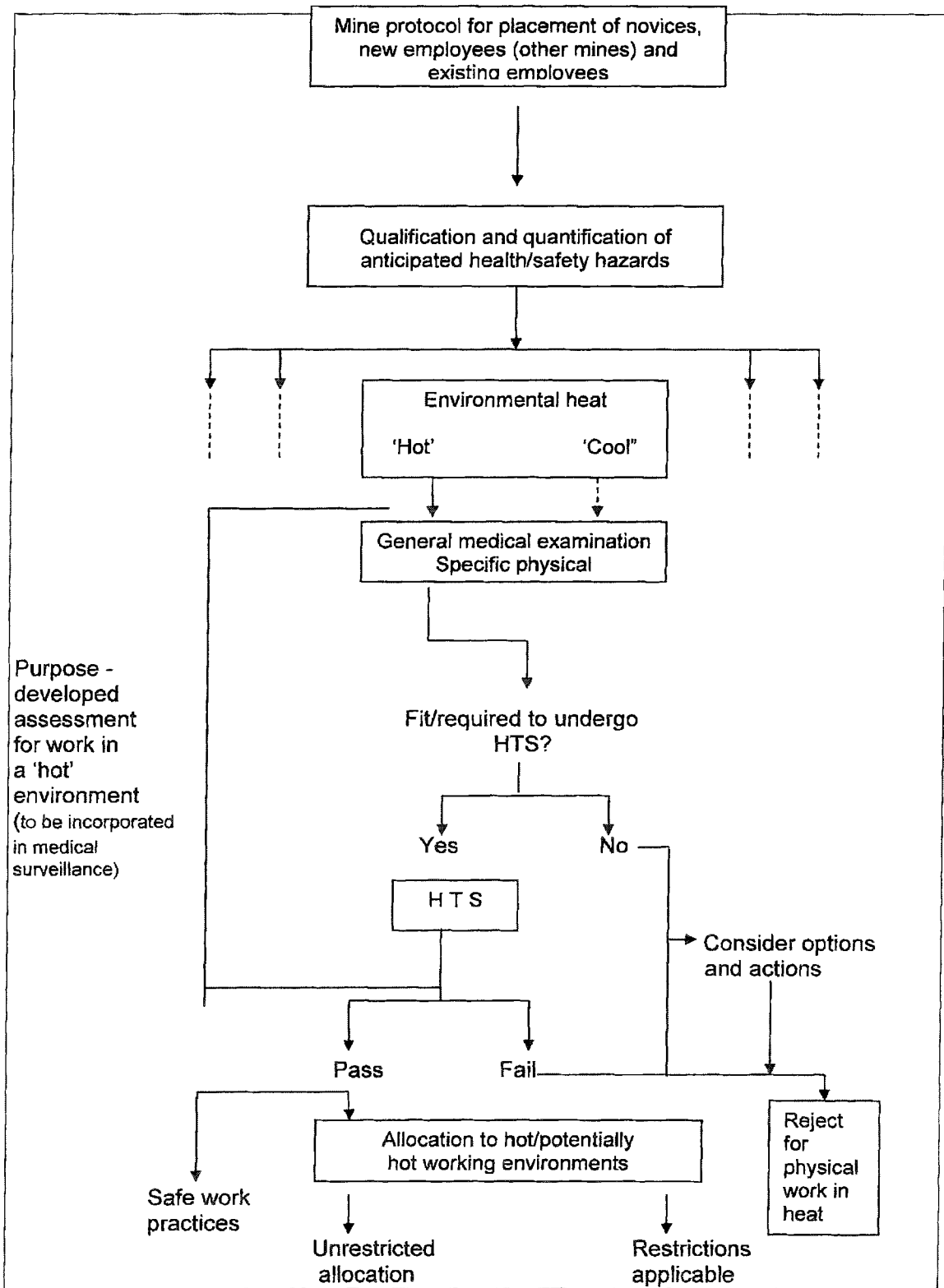
2. Functional Organisation

An overview of the functional organization of Heat Stress Management is presented in the form of a flow-chart (Figure 1.2). For actual implementation of Heat Stress Management along the lines suggested, it should be clear that the inputs required at various levels become quite specialized. Appropriate disciplines and departments can therefore be identified and their general responsibilities deduced.

Having established a structural organization, **the second step would be to ensure, as indicated above, that responsibilities are defined, and assigned to appropriate personnel and departments, and that effective inter-departmental communication links be established.** This is one of the key responsibilities of the 'HSM Programme Co-ordinator' listed in Figure 1.1.

OVERALL CONTROL OF HEAT STRESS MANAGEMENT





ANNEXURE 5:*(For information only)***MEDICAL / PHYSICAL EXAMINATIONS***(Overall fitness for work in hot environments)*

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

'**Strenuous work**' means any form of work in 'hot' environments where the work rate exceeds 160 Wm^{-2}

1. Introduction

The consequences of high environmental heat loads can be expressed in terms of impaired work capacity, errors of judgement with obvious implications for safety, and the occurrence of heat disorders, especially heat stroke which is often associated with severe and irreversible tissue damage and high mortality rates. It follows that overall fitness to undertake physical work in hot environments is a prerequisite and should conform to certain minimum standards. However, depending on circumstances, different sets of standards may be applied.

Overall fitness for work in hot environments will depend on the outcomes of

- A purpose-developed general medical examination,
- A specific physical evaluation, and
- An assessment of heat tolerance.

The above outcomes should be incorporated in the medical surveillance programme, as required in terms of section 13 of the Mine Health and Safety Act. As a general guideline, all employees who enter 'hot' environments in the normal course of their duties, irrespective of whether such work consists of daily full-shift exposures or intermittent or periodic exposures, which may be brief (one hour) or extended (full shift), should be screened for heat intolerance.

1.1 General medical examination

The nature of the general medical examination may well include elements specific to a particular occupation and associated hazards. In the present context the following listing applies to environmental heat as a health hazard, most notably where physically demanding work is undertaken.

- **History**
 - Occupational,
 - Medical, especially where treatment is based on medication which is likely to increase susceptibility to heat disorder significantly,
 - Family/social, including alcohol or substance abuse,
 - Outcome of previous HTS tests, and
 - Heat disorders (cramps, exhaustion, stroke),
- **Urinalysis**
 - Origins of haematuria, proteinuria and glycosuria should be established and assessed

- **The examination should exclude**
 - Jaundice;
 - Anaemia;
 - Cyanosis;
 - Clubbing;
 - Oedema;
 - Abnormal lymph nodes; and
 - Febrile disease.
- Uncontrolled hypertension (>160/95) and gross cardiovascular abnormalities require a full investigation. So-called 'functional' murmurs should not be considered a problem. Specialist opinion regarding fitness for physically demanding work in heat may be required. Hypertension should be controlled.
- The skin should be intact with no infections such as advanced athlete's foot, cellulitis, scabies, etc.
- Respiratory function, as determined by spirometry and chest X-ray, should be normal.
- Ear, nose and throat examination should exclude inflammation or infection (tonsillitis, pharyngitis, chronic suppurative otitis media, etc.).
- No organomegaly or hernias should be present.
- Gross neurological examination should be normal.
- No other abnormality that may compromise physical work in heat should be present.

Occupational Medical Practitioners should develop knowledge such that difficult decisions in 'grey' areas are taken fairly and professionally, bearing in mind the avoidable dangers of heat disorders.

1.2 Physical evaluation

The physical evaluation should be conducted as part of the medical examination but with special emphasis on features which would rule out physical work or exertion in heat. A specific requirement is to assess an individual's medical and physical fitness to undergo HTS.

1.2.1 Age

Age per se does not have a direct bearing on heat tolerance and should not serve as a contraindication for work in heat in isolation of other factors. Heat intolerance does, however, decline with reduced physical work capacity which, in turn, could have cardiovascular origins which do not necessarily become manifest through routine medical examinations. The underlying mechanism is an obligatory age-associated reduction in cutaneous vasodilatation (widening of skin blood vessels) and sweat rate (Yousef, 1987; Nunnely, 1998). A critical age limit of 50 years has been cited (Nunnely, 1998). This view is confirmed by local

studies which show a decided increase in heat stroke susceptibility with advancing years (Kielblock, 1992).

As a general recommendation employees of 50 years and above should only be considered for strenuous work in hot environments or placement in work categories where the full-shift physical work demand is regarded as strenuous, provided the complete absence of any other personal risk factor, including a special medical assessment, can be demonstrated. This recommendation also applies to emergency operations, even if only of short duration. As a general reference to categorize work in terms of physical demand, Figures 1 and 2 in Annex 10, should be consulted. Annex 10 is for information only.

1.2.2 General physical appearance

Any apparent physical deformity (e.g. congenitally acquired) or injury (e.g. amputations or joint malfunction) should be recorded. Where, in the opinion of the Occupational Medical Practitioner, any such deformity or injury precludes the employee from (a) undergoing HTS or (b) performing his work without undue physical discomfort, this should be stated clearly. The following options exist:

- Fit/unfit to undergo HTS,
- Fit for work in hot environments but unfit to undergo HTS and, therefore, exempted, and
- Totally unfit for any form of physical work.

1.2.3 Body dimensions

In this respect two criteria apply, namely

- an acceptable body mass to height ratio to rule out both under- and overweight individuals;
- minimum body mass as a criterion of the capacity to cope with externally imposed work demands. Body mass relative to height is often expressed in terms of the Body Mass Index or BMI (Ross et al, 1988); and
- It provides a better predictor of disease risk than weight (mass) alone. (It should not be used to assess competitive athletes or body builders, growing children and/or old and frail elderly individuals.) A high BMI leads to an increased risk to develop certain diseases, e.g. hypertension, cardiovascular disease, dyslipidaemia, adult-onset diabetes (type II), sleep apnea, osteoarthritis and other conditions. The above examples constitute a condition of co-morbidity, i.e. any condition associated with obesity (BMI of 30 - 35). Co-morbidity usually worsens as the degree of obesity increases, and often improves if successfully treated.

BMI can be calculated using the equation:

$$\text{BMI} = \text{body mass (kg)} / \text{height (m)}^2$$

The BMI is then expressed in terms of the following classification, the lower limit being based on the anthropometry of local mine workers (Schoeman et al, 1981):

- < 15 : emaciated
- 15 - 19 : underweight
- 20 - 25 : normal body fat content
- 26 - 29 : overweight (warning)
- 30 - 35 : obese (overt risk factor)
- > 35 : exclusion

The BMI should be used in conjunction with the essentially nude body mass to assess the adequacy of body dimensions relevant to physical work in hot environments. A distinction should be made between prospective or new employees ('novices' to mining) and existing employees. Calculated BMI values, for a wide range of body mass and height combinations, appear in Table 1.1 and a protocol for this assessment, in conjunction with a recommended course of action, is given below. A BMI of 30 or more constitutes a definitive risk factor.

TABLE 1.1: Body dimensions as criteria for physical work in hot environments

Employee Status	Criterion/Standard	Interpretation and recommended course of action
Prospective ('novice' ¹)	Body mass <50 kg	Unsuitable (BMI irrelevant): reject
	Body mass 50 – 55 kg	Suitable but not for 'strenuous' work ²
	BMI 15 – 29	Suitable
	BMI 30 – 35	Suitable with no medical contraindications
	BMI >35	Unsuitable: reject
Existing	Body mass <45 kg	Unsuitable (BMI irrelevant): reject
	Body mass 45 - 50 kg	Suitable with no medical contraindications or a history of heat disorders
	Body mass 45 - 55 kg	No allocation to 'strenuous' work (>160 w.m ⁻²)
	BMI < 15	Unsuitable ³
	BMI 15 – 19	Unsuitable ³
	BMI 20 – 29	Suitable with no medical contraindications or history of heat disorders
	BMI 30 – 35	Suitable
BMI >35	Suitable provided no medical contraindications or history of heat disorders Unsuitable ³	

¹ Novice - see 'Glossary' for definition

² Strenuous work - see 'Glossary' for definition

³ 'Unsuitable' implies withdrawal of certificate of fitness unless an acceptable BMI can be achieved within a reasonable time.

TABLE 1.1: Body Mass Index (BMI) as function of body mass and height

BODY MASS INDEX

		Mass (kg)																									
		50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73		
2.00	Height (m)	13	13	13	13	14	14	14	14	15	15	15	15	16	16	16	16	17	17	17	17	18	18	18	18		
1.98		13	13	13	14	14	14	14	15	15	15	15	16	16	16	16	17	17	17	17	18	18	18	18	19		
1.96		13	13	14	14	14	14	15	15	15	15	16	16	16	16	17	17	17	17	18	18	18	18	19	19		
1.94		13	14	14	14	14	15	15	15	15	16	16	16	16	17	17	17	18	18	18	18	19	19	19	19		
1.92		14	14	14	14	15	15	15	15	16	16	16	17	17	17	17	18	18	18	18	19	19	19	20	20		
1.90		14	14	14	15	15	15	16	16	16	16	17	17	17	17	18	18	18	19	19	19	19	20	20	20		
1.88		14	14	15	15	15	16	16	16	16	17	17	17	18	18	18	18	19	19	19	20	20	20	20	21		
1.86		14	15	15	15	16	16	16	16	17	17	17	18	18	18	18	19	19	19	20	20	20	21	21	21		
1.84		15	15	15	16	16	16	17	17	17	17	18	18	18	18	19	19	19	19	20	20	20	21	21	22		
1.82		15	15	16	16	16	17	17	17	18	18	18	18	19	19	19	20	20	20	21	21	21	21	22	22		
1.80		15	16	16	16	17	17	17	18	18	18	18	19	19	19	20	20	20	21	21	21	22	22	22	23		
1.78		16	16	16	17	17	17	18	18	18	19	19	19	20	20	20	21	21	21	22	22	22	23	23	23		
1.76		16	16	17	17	17	18	18	18	19	19	19	20	20	20	21	21	21	22	22	22	23	23	23	24		
1.74		17	17	17	18	18	18	18	19	19	19	20	20	20	21	21	21	22	22	22	23	23	23	24	24		
1.72		17	17	18	18	18	19	19	19	20	20	20	21	21	21	22	22	22	23	23	23	24	24	24	25		
1.70		17	18	18	18	19	19	19	20	20	20	21	21	22	22	22	23	23	23	24	24	24	25	25	25		
1.68		18	18	18	19	19	19	20	20	21	21	21	22	22	22	23	23	23	24	24	24	25	25	26	26		
1.66		18	19	19	19	20	20	20	21	21	21	22	22	22	23	23	24	24	24	25	25	25	26	26	26		
1.64		19	19	19	20	20	20	21	21	22	22	22	23	23	23	24	24	25	25	25	26	26	26	27	27		
1.62		19	19	20	20	21	21	21	22	22	22	23	23	24	24	24	25	25	26	26	26	27	27	27	28		
1.60		20	20	20	21	21	21	22	22	23	23	23	24	24	25	25	25	26	26	27	27	27	28	28	29		
1.58		20	20	21	21	22	22	22	23	23	24	24	24	25	25	26	26	26	27	27	27	28	28	29	29		
1.56		21	21	21	22	22	23	23	23	24	24	25	25	25	26	26	27	27	28	28	28	29	29	30	30		
1.54		21	22	22	22	23	23	24	24	24	25	25	26	26	27	27	27	28	28	29	29	30	30	31	31		
1.52		22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	29	30	30	31	31	31	32	32		
1.50		22	23	23	24	24	24	25	25	26	26	27	27	28	28	28	29	29	30	30	31	31	32	32	32		

BODY MASS INDEX

		Mass (kg)																								
		74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	
2.00	Height (m)	19	19	19	19	20	20	20	20	21	21	21	21	22	22	22	22	23	23	23	23	24	24	24	24	
1.98		19	19	19	20	20	20	20	21	21	21	21	22	22	22	22	23	23	23	23	24	24	24	24	25	
1.96		19	20	20	20	20	21	21	21	21	22	22	22	22	23	23	23	23	24	24	24	24	25	25	25	
1.94		20	20	20	20	21	21	21	22	22	22	22	23	23	23	23	24	24	24	24	25	25	25	26	26	
1.92		20	20	21	21	21	21	22	22	22	23	23	23	23	24	24	24	24	25	25	25	25	26	26	26	
1.90		20	21	21	21	22	22	22	22	23	23	23	24	24	24	24	25	25	25	25	26	26	26	27	27	
1.88		21	21	22	22	22	23	23	23	23	24	24	24	25	25	25	25	26	26	26	26	27	27	27	27	
1.86		21	22	22	22	23	23	23	23	24	24	24	25	25	25	26	26	26	26	27	27	27	27	28	28	
1.84		22	22	22	23	23	23	24	24	24	25	25	25	25	26	26	26	26	27	27	27	28	28	28	29	
1.82		22	23	23	23	24	24	24	24	25	25	25	26	26	26	27	27	27	27	28	28	28	29	29	29	
1.80		23	23	23	24	24	24	25	25	25	26	26	26	27	27	27	27	28	28	28	29	29	29	30	30	
1.78		23	24	24	24	25	25	25	26	26	26	27	27	27	27	28	28	28	29	29	29	30	30	30	31	
1.76		24	24	25	25	25	26	26	26	26	27	27	27	28	28	28	29	29	29	30	30	30	31	31	31	
1.74		24	25	25	25	26	26	26	27	27	27	28	28	28	29	29	29	30	30	30	31	31	31	32	32	
1.72		25	25	26	26	26	27	27	27	28	28	28	29	29	29	30	30	30	31	31	31	31	32	32	32	
1.70		26	26	26	27	27	27	28	28	28	29	29	29	30	30	30	31	31	31	32	32	33	33	33	34	
1.68		26	27	27	27	28	28	28	29	29	29	30	30	30	31	31	32	32	32	33	33	33	34	34	34	
1.66		27	27	28	28	28	29	29	29	30	30	30	31	31	31	32	32	32	33	33	33	34	34	35	35	
1.64		28	28	28	29	29	29	30	30	30	31	31	31	32	32	32	33	33	33	34	34	35	35	36	36	
1.62		28	29	29	29	30	30	30	31	31	32	32	32	33	33	33	34	34	34	35	35	35	36	36	37	37
1.60		29	29	30	30	30	31	31	32	32	32	33	33	33	34	34	34	35	35	36	36	36	37	37	38	38
1.58		30	30	30	31	31	32	32	32	33	33	34	34	34	35	35	36	36	36	36	37	37	38	38	39	39
1.56		30	31	31	32	32	32	33	33	34	34	35	35	35	36	36	37	37	37	38	38	39	39	39	40	40
1.54		31	32	32	32	33	33	34	34	35	35	35	36	36	37	37	38	38	38	39	39	40	40	40	41	41
1.52		32	32	33	33	34	34	35	35	35	36	36	37	37	38	38	39	39	39	40	40	41	41	42	42	42
1.50		33	33	34	34	35	35	36	36	36	37	37	38	38	39	39	40	40	40	41	41	42	42	43	43	43

BODY MASS INDEX

		Mass (kg)																											
		98	99	10	10	10	10	10	10	10	10	10	10	10	10	11	11	11	11	11	11	11	11	11	11	12			
		0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4			
2.00	Height (m)	25	25	25	25	26	26	26	26	27	27	27	27	27	28	28	28	28	28	29	29	29	29	29	29	29	30	30	30
1.98		25	25	26	26	26	26	27	27	27	27	28	28	28	28	29	29	29	29	29	30	30	30	30	30	31	31	31	31
1.96		26	26	26	26	27	27	27	27	28	28	28	28	29	29	29	29	29	30	30	30	30	30	31	31	31	31	31	31
1.94		26	26	27	27	27	27	28	28	28	28	29	29	29	29	30	30	30	30	31	31	31	31	31	31	31	31	31	31
1.92		27	27	27	27	28	28	28	28	29	29	29	29	30	30	30	30	31	31	31	31	31	31	31	31	31	32	32	32
1.90		27	27	28	28	28	29	29	29	29	29	30	30	30	30	31	31	31	31	32	32	32	32	32	32	33	33	33	33
1.88		28	28	28	29	29	29	29	30	30	30	30	31	31	31	31	31	32	32	32	32	33	33	33	33	33	34	34	34
1.86		28	29	29	29	29	30	30	30	30	31	31	31	31	32	32	32	32	33	33	33	33	33	34	34	34	34	34	35
1.84		29	29	30	30	30	30	31	31	31	31	32	32	32	32	33	33	33	34	34	34	34	35	35	35	35	35	35	35
1.82		30	30	30	30	31	31	31	31	32	32	32	32	33	33	33	33	34	34	34	34	35	35	35	35	36	36	36	36
1.80		30	31	31	31	31	32	32	32	32	33	33	33	34	34	34	34	35	35	35	35	35	35	36	36	36	37	37	37
1.78		31	31	32	32	32	33	33	33	33	33	34	34	34	35	35	35	36	36	36	36	36	37	37	37	37	38	38	38
1.76		32	32	32	33	33	33	34	34	34	34	35	35	35	36	36	36	36	36	37	37	37	37	38	38	38	38	39	39
1.74		32	33	33	33	34	34	34	34	35	35	35	36	36	36	37	37	37	37	38	38	38	38	38	39	39	39	39	40
1.72		33	33	34	34	34	35	35	35	36	36	36	37	37	37	38	38	38	39	39	39	39	40	40	40	40	40	41	41
1.70		34	34	35	35	35	36	36	36	37	37	37	38	38	38	39	39	39	40	40	40	40	41	41	41	41	41	41	42
1.68		35	35	35	36	36	36	37	37	38	38	38	39	39	39	40	40	40	40	41	41	41	41	42	42	42	42	42	43
1.66		36	36	36	37	37	37	38	38	38	39	39	40	40	40	40	41	41	41	41	42	42	42	42	43	43	43	43	44
1.64		36	37	37	38	38	38	39	39	39	40	40	40	41	41	41	42	42	42	42	43	43	43	44	44	44	44	44	45
1.62		37	38	38	38	39	39	40	40	40	40	41	41	41	42	42	42	42	43	43	43	43	44	44	44	45	45	45	46
1.60		38	39	39	39	40	40	41	41	41	41	42	42	42	43	43	43	43	44	44	44	45	45	45	45	46	46	46	47
1.58		39	40	40	40	41	41	42	42	42	42	43	43	43	44	44	44	45	45	45	46	46	46	46	47	47	47	48	48
1.56		40	41	41	42	42	42	43	43	43	44	44	44	45	45	45	46	46	46	46	47	47	47	48	48	48	48	49	49
1.54		41	42	42	43	43	43	44	44	44	45	45	45	46	46	46	46	47	47	47	48	48	48	48	49	49	49	50	50
1.52		42	43	43	44	44	44	45	45	45	46	46	46	47	47	47	48	48	48	49	49	49	50	50	51	51	51	52	52
1.50		44	44	44	45	45	46	46	47	47	48	48	48	48	49	49	49	50	50	50	51	51	51	52	52	52	53	53	53

In summary, the above protocol comprises

- Making a distinction between prospective or new employees (novices) and existing employees,
- Recording both mass (kg) and height (m rounded to the second decimal, e.g. 1.75), conducting the initial screening using only body mass, i.e. <50 kg for novices and <45 kg for existing employees signifies rejection or withdrawal of certificates of fitness,
- Extending the initial screening to an assessment based on BMI, and finally
- Flagging screened employees with a body mass of (55 kg as 'unsuitable' for allocation to strenuous full- shift work in heat.

1.3 Heat as a Health and Safety Hazard: Information Base for Risk Assessment

Heat stroke is widely held to be multifactorial in origin, an observation which is certainly also applicable to the South African mining industry (Kielblock, 1992). However, whereas considerable effort has been devoted in the past to prevent heat disorders, most notably heat stroke, attempts to deal with heat from a safety and productivity point of view have been less focussed. In this respect, the benefits of a systematic reduction in wet-bulb temperature have been amply demonstrated in local gold mining context (Smith, 1984). It remains to point out that the converse

also holds true: any escalation in the environmental heat load is likely to be associated with an increase in accident frequency rate and a fall in productivity.

In order to assess risk, and to subsequently manage it, a data base appropriate to the development of proactive strategies is essential. This section, therefore, provides some guidance with particular reference to a personal (employee) risk profile and heat disorder (heat stroke) incident analysis. It is suggested that safety issues be investigated along similar lines and the findings linked to the same data base as proposed here.

1.3.1 Employee risk profile

On the basis of the preceding sections it is quite feasible to develop a 'risk profile' for any employee destined to enter 'hot' working environments in the execution of their duties and responsibilities. This profile consists of the following elements, namely

- Medical contraindications, i.e. a particular condition, treatment or even a medical history likely to lead to a critical job-related reduction in heat tolerance,
- Age ((50 years) in concert with full-shift exposures to 'strenuous' work in heat,
- Obesity (BMI (30),
- Heat intolerance, i.e. a chronic inability to successfully complete HTS,
- Strenuous work per se, and
- A history of heat disorders.

Recurring incidents of heat cramps and heat exhaustion should be construed as an inability to develop a satisfactory degree of heat acclimatization for a particular job, exposure time and environmental heat load. Medical surveillance should be sufficiently sensitive to identify such employees and the Occupational Medical Practitioner should have no hesitation in reclassifying the employee as 'heat intolerant'. However, it follows that a distinction exists between incidents of heat disorders which only affect a small number of employees in a chronic manner, thus reflecting possible inherent heat intolerance, and those linked to poor environmental control. To classify an employee as 'heat intolerant' within the latter context is clearly inappropriate.

The above scenario is not applicable to heat stroke. The reason is that heat stroke is generally associated with extensive multi-organ damage, often of an irreversible kind. As a result heat tolerance is usually severely impaired, irrespective of whether the basic cause is 'inherent heat intolerance' or due to poor environmental control, and persists long after full clinical recovery from the incident (Armstrong et al, 1990; Epstein, 1990; Bricknell, 1996). In fact, heat intolerance has been demonstrated to persist for periods from about three months to as long as five years following heat stroke. There is, therefore, strong evidence to suggest that **heat stroke may well render an employee permanently unfit for physical work in heat.**

In developing an employee risk profile on the basis of the above elements, it is obvious that no hard and fast rules can be set. The estimation of risk will, therefore, remain somewhat imprecise. A threefold approach is recommended, namely

- a risk profile which features only one of the above elements, especially where it can be controlled or brought under control, should be regarded as 'acceptable',
- the presence of any two factors (elements) should be viewed with concern and should not be condoned unless the situation can be ameliorated, for example through specially-developed safe work practices, and
- a profile containing more than two undesirable elements will constitute an unacceptable risk.

Combinations of risk factors (elements) which should not be condoned under any circumstances are given in Table 1.2.

FIGURE 1.2: Employee risk profile matrix

Primary risk factor ¹	Secondary risk factor ¹					
	Medical contraindication ²	Age >50 plus strenuous work	BMI ≥30	Heat intolerance	Strenuous work	History of heat disorders
Medical contraindication ²		X	0	0	0	X
Age ≥50 plus strenuous work	X		X	X		X
BMI ≥30	0	X		X	X	X
Heat intolerance	0	X				X
Strenuous work	0		X	X		X
History of heat disorders	X	X	X	X	X	

¹ See text for full description of respective factors

² Medical contraindications require a good deal of discretion; for example, insulin-dependent diabetes may well constitute an 'unacceptable' risk even in the absence of all other risk factors. The Occupational Medical Practitioner's discretion and decisions are, therefore, paramount.

⁰ The specific combination of risk factors can be condoned if considered on individual merit and taking into consideration specific circumstances.

^x The combination of risk factors should not be condoned unless under exceptional circumstances.

1.4 Incident Analysis

Incidents of heat stroke have been fairly well investigated in the past and considerable emphasis has fallen on the 'multi-factorial' nature of such incidents. Clearly, therefore, any investigation into the occurrence of heat stroke, including other heat disorders, should be conducted in such a way that the major causal factors are identified. This would enable the development of proper strategies and action plans, as well as providing the basis for regular review. The following framework, presented under specific headings, is proposed.

- General information Mine/shaft/business unit Operation (e.g. gold)
Location/area of work.
- Personal particulars:
 - Name/identification or company number;
 - Country/town of origin;
 - Total mining experience Duration of present contract Personal/employee risk profile;
 - Work category (also rate strenuous/non-strenuous).
- Nature of incident/diagnosis (heat cramps, heat exhaustion/syncope, heat stroke)
- Temporal information
 - Date;
 - Day of the week;
 - Time of the day;
 - Duration of shift until incident; and
 - Number of days in working area (if less than 12, record information on previous area of work)
- Causal factors
 - Nature of work (typical/atypical of normal occupation);
 - Environmental heat load (DB, WB, air velocity, radiant temperature, time and date of assessment);
 - 24-hour history* (eating, drinking, well-being, etc.) Water intake (normally, prior to incident); and
 - Water availability (*Obtain this history from work or close companions and supervisors).
- Signs and symptoms
 - Behavioural;
 - Subjective complaints;
 - Physical signs; and
 - Body temperature (oral/rectal; time of first recording).

- * Treatment (Emergency/initial treatment)
 - Recognition (correct/incorrect)
 - Nature of treatment
 - Details of further events and recordings (include formal medical assistance)
 - Add clinical/hospital records

Historical information and trends are of extremely limited value unless the data base enables direct assessments and control virtually on a day-to-day basis. In turn, this will enable the assessment and management of risk, strategy development and, ultimately even, good epidemiology. Reviews should be conducted at regular intervals, say every three months.

ANNEXURE 6*(For information only)***HEAT TOLERANCE SCREENING**

Definitions and acronyms

'HTS' means Heat tolerance screening.

'HTT' means Heat Tolerance Test; i.e. a one-hour heat tolerance test used for the evaluation of rescue brigadesmen.

1. Introduction

Paragraph 1 considers the objectives, interpretation and protocols associated with HTS. The infrastructural and procedural aspects are dealt with in paragraphs 2, 3 and 4 below.

1.1 Objectives

The primary objective of Heat Tolerance Screening is to identify gross or inherent heat intolerance (i.e. individuals with an unacceptable risk of developing excessively high levels of hyperthermia during work in heat). Such levels of heat intolerance could be temporary or permanent (inherent) and, in order to make these distinctions, repetitive HTS tests, as detailed in the text, are permitted. The nature of the test is such that it also provides a measure of physical fitness and, as such, serves as a second objective.

HTS should not be confused with or seen as an alternative to the old four-hour Heat Tolerance Test (HTT). With regard to the latter, the purpose was to identify the so-called hyper heat tolerant (HHT) individual whose inherent level of heat tolerance was such that no conventional heat acclimatization was needed. It should, therefore, be clear that HTS has an entirely different purpose, namely it provides an assessment of risk.

1.2 Interpretation

The outcome of the HTS provides a classification which is primarily directed at making a distinction between 'potentially heat tolerant' and 'inherently/grossly heat intolerant'. Classification into either category will depend on

- Oral temperature responses, as given below, and
- The absence of any abnormal response during or at the end of the test, e.g. collapse, vomiting, headache and lack of co-operation.

- **Potentially heat tolerant**

Any person whose oral temperature does not exceed 37,6°C i.e. should be $\leq 37,6^{\circ}\text{C}$) at the end of the test should be classified as 'potentially heat tolerant'. This implies that that person is fit to undertake physically demanding

work in a 'hot' environment and that he will be able to acclimatise successfully with regular exposure.

- **Grossly heat intolerant**

Individuals with oral temperatures in excess of 37,6°C (i.e. should be $\leq 37,6^{\circ}\text{C}$) on completion of the test should be considered to be heat intolerant and not be allocated to work in 'hot' areas, unless under carefully specified circumstances (see section 1.3).

In the event of failure of the HTS, candidates may present themselves once more for retesting but not within a period of two days. With management's discretion, however, and taking into consideration individual merits and medical advice, a second retest is permissible. Repeated failure of the HTS would normally disqualify a candidate from work in hot areas. However, each case should be dealt with on individual merit. Section 1.3.3 provides some guidance in this regard.

1.3 Eligibility, Frequency of Screening and Outcome Implications Associated with HTS

In terms of a general protocol for the application of HTS, a number of issues can be identified for incorporation into the mine's code of practice. These issues, which therefore require careful consideration, are listed below in conjunction with recommendations and alternatives.

1.3.1 Eligibility

HTS should be seen as one of a number of criteria determining overall fitness for physical or physically demanding work in hot environments. For this reason, all employees who enter hot environments in the normal execution of his duties or responsibilities should ideally be screened. There should be no distinction between employees who are exposed to hot environments on a daily full- shift basis and those who only enter such areas sporadically (once a week or once a month, etc.) or for indeterminate periods (e.g. from a few hours to a full shift).

1.3.2 Frequency of heat tolerance screening

The frequency of HTS will be determined by the outcome of the routine medical and physical assessments, as described in Annexure 5, sections 1.1 and 1.2. Annexure 5 is for information only. There are two possible scenarios.

- Any employee deemed 'fit for physical work in a hot environment' by virtue of the most recent annual assessment, inclusive of successfully passing the HTS test, will be required to repeat HTS at an appropriate interval as determined by the medical discretion of the OMP. Any medical risk factor identified, especially of circulatory, metabolic or physical origin, as well as any incident associated with heat intolerance, should necessitate the OMP to adjust the HTS frequency to a more appropriate interval.

- The consequence of failing the routine annual medical and physical examination falls within the powers of discretion of the Occupational Medical Practitioner. In this respect HTS could, under certain circumstances, provide an additional option. Therefore, where the medical and/or physical status of an employee is suspect, HTS could be conducted on an annual basis as an adjunct to the medical and physical assessments.

In summary, therefore, the frequency of HTS could be relaxed provided the results from annual medical and physical screening examinations fall within acceptable norms.

1.3.3 HTS outcome implications

Any individual who passes the HTS test can be allocated to work in hot environments without any restrictions. The only possible disqualification is a medical history of recurring heat disorders, notably heat exhaustion, or of heat stroke, even if only a single incident.

With regard to failure of HTS, a distinction should be made between new employees or recruits (novices to mining), and existing employees. New employees who fail should be regarded as 'unfit for any form of physical work in a hot environment', irrespective of medical or physical status.

Where existing employees fail HTS, the following protocol is recommended. Firstly, a special medical examination should be considered with the express purpose of ruling out the presence of underlying risk factors contra-indicating physical work in heat, e.g. a stress electrocardiogram. The medical assessment should also take into consideration the employee's medical history, again with the propensity for heat disorders. Where recurring heat disorders are evident, this should be regarded as a disqualification.

Secondly, all physical parameters (height, age, mass, etc) must fall within accepted norms.

On the basis of favourable outcomes to the above re-assessments, the employee may be allocated to work in hot environments provided that

- * Individualised counselling on the relevant risks and precautions is conducted, acknowledged and formalized,
- The employee accepts that the future occurrence of any heat disorder may render him unfit for any form of work in hot environments,
- The employee is not allocated to 'strenuous' work categories, i.e. those falling within a work rate range of 160 W.m⁻²; in this regard refer to Annex 7, Figures 1.1 and 1.2 which provide guidance,
- No form of emergency or special operations are undertaken in 'hot' or 'abnormally hot' environments,

- Routine work is only undertaken under 'close supervision' while also observing safe work practices on a permanent basis, as documented in Annex 7, Annex 7 is for information only ,and
- Non-routine work (periodic or intermittent exposure to 'hot' environments) is not carried out unless accompanied by, and under direct instruction of, a specially designated and qualified person; this implies dedicated 'formal supervision'.

Full details of 'formal supervision' and safe work practices are provided in Annex 7 Annexure 7 is for information only.

Infrastructures and Procedure

2. Facilities and Supervision

2.1 Quality control

HTS should be conducted only in climatic chambers with a satisfactory degree of environmental control, and only under the supervision of qualified personnel. The requirements imply a system of quality control consisting of

- Regular (monthly) internal audits of climatic chamber temperature control and of the accuracy and calibration status of all instrumentation,
- A comprehensive annual audit of supervision proficiency and of the facility in its entirety (records, instrumentation, referrals, reports, etc); this audit should be conducted only by an independent accredited occupational hygienist with applicable and relevant experience, and
- Independent audits also on the basis of unsatisfactory internal audits.

2.2 Supervisors' credentials

Supervisors should be in possession of a certificate issued by a recognized training authority. In the past such certificates were issued by the Chamber of Mines of South Africa but this function was subsequently transferred to the Division of Mining Technology of the CSIR. Presenters of such courses should be registered occupational hygienists with extensive and practical experience of Heat Stress Management and all its facets.

Annual audits conducted by independent assessors should include recommendations on supervisors in need of refresher courses.

2.3 Climatic chamber hygiene

The hot humid conditions that prevail in climatic chambers are conducive to the proliferation of micro-organisms. Since faecal and seral contamination in climatic chambers has been documented, it is imperative that a satisfactory standard of hygiene be maintained in order to protect staff and workers.

Diseases which occur sporadically in the mining industry, such as meningitis, typhoid, gastro-enteritis, tuberculosis, cholera, hepatitis-A and - B as well as numerous others including sexually transmitted diseases, pose a potential threat to the health and well-being of workers and climatic chamber personnel. Vaccines against hepatitis-B and other diseases are available and it is recommended that appropriate measures be taken to safeguard potentially exposed personnel.

3. Precautions during screening

3.1 Disinfectants

It is imperative that a suitable disinfecting agent be used for each of the various applications at the HTS centre. No disinfectant solution should be prepared more than 12 hours before use.

3.2 Hand washing

Before entering the climatic chamber all test centre personnel should wash their hands thoroughly with a disinfectant soap on arrival at the centre and again after visiting toilets. Inside the climatic chamber test centre, personnel should wash their hands thoroughly with a disinfectant soap before and after measuring body temperature.

Open containers of disinfectant soap solution should be available for workers to rinse their hands after visiting urinals. In order to encourage the use of the soap solution, attendants should immediately discard and replace any solution which appears to have become contaminated.

3.3 Footbath

On entering and leaving the climatic chamber each worker should place both feet in a footbath filled with a freshly prepared sodium hypochlorite solution (2 000 ppm) or potassium permanganate solution (1 gram per 10 litres of water).

3.4 Thermometers

Thermometers should be disinfected by total immersion in a container of freshly prepared sodium hypochlorite solution (2 000 ppm) for at least 30 minutes. Once measurements have been recorded, thermometers should be immersed in a sodium hypochlorite solution for at least 30 minutes before reuse.

Where rechecks are necessary, only freshly disinfected thermometers should be used. At no time should a thermometer be reused without having remained in disinfectant solution for at least 30 minutes.

3.5 Stepping boards

Stepping boards should be of a suitable non-porous material. Wooden or hardboard stepping boards are not suitable for use in a climatic chamber. All stepping boards used during a shift should be washed, disinfected and allowed to dry before being returned to storage.

3.6 Shower facilities

To ensure that workers effectively clean and cool themselves after completion of the test, they should shower, washing themselves thoroughly with soap and water. The temperature of the shower water should preferably be controlled at $35,0 \pm 5,0^{\circ}\text{C}$ by means of a 'master mixer'. After showering each man should be provided with a freshly laundered cotton towel.

3.7 Laundering

Athletic shorts or skirts used during stepping procedures should be disinfected and laundered prior to reuse.

3.8 Disinfection

3.8.1 Climatic chamber

After every test the climatic chamber should be washed out thoroughly with disinfectant and water. Excess water should be removed using 'squeegees'. Finally, a freshly prepared sodium hypochlorite solution (2 000 ppm) is recommended for disinfecting the floor, concrete stepping beams and walls.

It should be noted that sodium hypochlorite may cause corrosion of metal objects, e.g. urinals and taps. For these applications disinfectant soap should be used.

3.8.2 Restroom

Sodium hypochlorite may cause corrosion of metal objects, e.g. urinals and taps. For these applications disinfectant soap should be used.

3.9 General maintenance

3.9.1 Condition of floor and walls

Uneven surfaces and cracks should be repaired as soon as possible while the use of wooden components and materials in a climatic chamber should be avoided, as these are ideal places for the growth of infectious organisms.

3.9.2 Ongoing monitoring

The introduction of the vibrio cholera into climatic chambers has been documented. Faecal contamination of the environment, e.g. via drinking water, floors, air humidifying reservoirs and main sewer lines, may well occur as a result of profuse perspiration flowing across the peri-anal region of carriers undergoing the HTS.

Apart from maintaining strict hygiene during and after climatic room procedures, it is recommended that a formal monitoring programme be implemented.

When substandard conditions exist, appropriate interventions must be applied.

4. General procedure

The procedures to be followed comprise essentially the pre-test period and, subsequently, the HTS itself. The test should ideally be conducted in the forenoon following a light breakfast taken at least one hour before the test is due. However, if from a logistics point of view it would be preferable to conduct the HTS test later in the day, this would be equally acceptable.

4.1 Pre-test procedures

4.1.1 Rest Period

A rest period of 30 minutes should be allowed before HTS commences. The environment should be comfortable for men wearing only shorts ($27, 0 \pm 2, 0^{\circ}\text{C}$ dry-bulb; $<20, 0^{\circ}\text{C}$ wet-bulb). During this time smoking should be prohibited, and no form of liquid refreshment should be taken during the last 20 minutes before the test. During the rest period supervisors should be alert to detect any apparent signs indicative of alcohol and/or drug abuse, or of illness or sickness.

4.1.2 Induction

In order to foster an understanding on the part of the workers and to elicit their co-operation, every effort should be made to inform them of the reasons and procedures for HTS. In addition, the preventive measures and procedures to be followed during the period of natural acclimatization, where applicable should be detailed so that workers are fully acquainted with the procedures, as well as factors which may affect their heat tolerance.

4.1.3 Initial body temperature recording

Oral temperatures should be measured only with thermometers checked for accuracy by an accredited institution. This check is carried out against a certified thermometer in a water-bath at temperatures of $37,0^{\circ}\text{C}$ and $39,0^{\circ}\text{C}$, respectively.

Oral temperatures are measured upon completion of the rest period. Care should be exercised to ensure that the thermometers are 'shaken down' properly before measurements are made. The thermometer bulb should be placed under the tongue, with the stem protruding from the corner of a closed mouth for at least three minutes before being read. After recording the reading the thermometer should be properly sterilized.

Any individual displaying resting oral temperature of more than $37, 0^{\circ}\text{C}$ ($37,1^{\circ}\text{C}$) should be rejected for HTS. Any individual displaying an oral temperature of more than $37, 0^{\circ}\text{C}$ should be referred for medical evaluation as a potential fever case. With the approval of the mine medical officer, such individuals can be readmitted for testing at a later date. However, under no circumstances may oral temperatures of $37,1^{\circ}\text{C}$ be condoned.

4.2 Test procedure

4.2.1 Environmental conditions

The HTS test should be carried out at a dry-bulb temperature of 29,5°C and a wet-bulb temperature of 28,0°C. Environmental temperatures should be measured and recorded at five-minute intervals at various locations in the climatic chamber.

Ideally, the climatic chamber should be operated at the optimum wet-bulb temperature of 28,0°C, with a maximum permissible range of 27,7 to 28,5°C. Corrective action should therefore be initiated as soon as the temperature deviates from 28,0°C wet-bulb, and not only once the permissible range is exceeded. The optimum difference between the dry-bulb and wet-bulb temperatures is 1,5°C. The dry-bulb/wet-bulb difference should never be less than 1,0°C or more than 2,0°C.

The test should be discontinued immediately if any deviations from the above range occur. In such an event, these men could be retested the following day.

In addition to environmental temperatures, the air movement in the climatic chamber must also be controlled within the range of 0,3 to 0,5 m.s⁻¹ in all areas of the chamber where men step. This should be confirmed during monthly inspections by the Environmental Control Department on mines. The HTS should not be allowed to commence unless prescribed environmental conditions already exist in the climatic chamber.

4.2.2 Work rate, duration and stepping procedure

An external work rate of approximately 80 W (positive component) should be maintained by a bench-stepping regimen at a fixed step rate of 24 steps per minute and a fixed stepping height of 30,5 cm. The duration of the test is 30 minutes.

The stepping procedure should be performed in the following manner: the upper body should be erect, the arms should swing freely, the same foot must lead in the upward and downward movement of any given step, both feet should complete the full cycle, the upper body may not be supported by hands placed on the thighs, and the period on the beam should equal the period on the floor.

A fully completed step is defined as the movement of the body from the floor up onto the stepping beam, by using both feet, and back to the original position on the floor, again by using both feet.

4.2.3 Assessment of relative heat tolerance

The assessment of relative heat tolerance is based on oral temperature which is recorded at the end of the 30-minute bench-stepping exercise. Thermometers should be issued on an individual basis and sterilized at the conclusion of the assessment.

The thermometer bulb should be placed under the tongue and away from the teeth, with the stem protruding from the corner of the closed mouth for a period of at least three minutes before being read. Supervisors should ensure that mouth breathing is not permitted. In fact, in such cases the supervisors should regard the measurements as invalid and, on this basis, refer the person for a retest.

During the three-minute period men should sit on the stepping beam to minimize post-exertional syncope ('black-out') and to minimize possible injury to themselves should they fall. Supervisors should be alerted to this eventuality.

4.2.4 Related procedures and precautions

Supervisors should also be on the alert for signs of early heat exhaustion, overt fatigue or imminent collapse and should not hesitate to remove from the chamber any such cases which, in their opinion, warrant this action. Further action or treatment would depend on specific circumstances. However, all such cases should be referred for medical examination with a formal report of events surrounding the incident.

Any person who stops stepping, except to regain his stride, or who leaves the climatic chamber before the end of the test, can be re-subjected to the HTS within a period of 24 hours. If a person who is regarded as fit to undergo HTS by virtue of both a medical and physical examination, but is incapable of completing a HTS test on two successive attempts, he should be regarded as unfit for any form of work of a physical nature.

ANNEXURE 7*(For information only)***WORK PRACTICES: SURFACE, OPENCAST AND UNDERGROUND OPERATIONS****1. Rationale for Work Practices**

Within the context of Heat Stress Management, no form of heat acclimatization will have preceded the allocation of employees to 'hot' areas of work. Workers will have been screened only for gross heat intolerance and will be expected to commence duties without the advantage of acclimatization. Special precautions are, therefore, indicated, the rationale being based on the major causes of heat stroke in mining (Kielblock, 1992). The relevant statistics are, therefore, important to all levels of line management directly responsible for the execution of Heat Stress Management (Table 1.1).

TABLE 1.1: Direct casual factors implicated in development of heat stroke

Factor	Prevalence	
	n	%
Strenuous work ¹	82	85
Atypical ²	19	20
Lashing	18	19
Drilling	16	17
Transporting	15	15
Pack building	12	12
Winching	2	2
Suspect heat tolerance	50	52
Dehydration	48	50
Alcohol	32	33
No water	13	14
Emetics/Laxatives	3	3
Excessive heat	27	28
Wet-bulb > 32,5°C	21	22
Dry-bulb > 37°C	6	6
TOTAL		215

¹ These categories exhibit the highest mean metabolic rates of mining tasks and on average exceed 160 W.m⁻²

² A typical work is strenuous work not normally associated with a particular work category.

A review of the occurrence of heat stroke over the past decade identifies 'strenuous work' as the single most important causal factor, followed by suspect heat tolerance, dehydration and excessively hot (dry- bulb >37,0°C, wet-bulb >32,5°C) thermal conditions.

Figures 1.1 and 1.2 lists the work rates of a number of surface and underground work categories. Investigations over the past decade or so reveal that the incidence of heat stroke is related mainly to work categories associated with strenuous work (Kielblock 1992). On this basis it could be argued that any work associated with mean metabolic rates in excess of 160 W./m^2 constitutes an unacceptable heat stroke risk. In numerous instances 'strenuous' work not normally associated with a particular job description, and therefore regarded as 'atypical', has been identified as the most critical in terms of heat stroke risk.

'Suspect heat tolerance' refers to instances where the incident could be related to poor health, a history of heat disorders, low work capacity in relation to work demand and, notably, inappropriate exemptions from any form of screening.

Water intake is generally inadequate, either through voluntary restrictions or the non-availability thereof. Moreover, alcohol-induced dehydration has been implicated in more than 30 per cent of heat stroke cases.

Further analysis reveals that excessively hot thermal environments constitute the most serious complication in the incidence of heat stroke fatalities. In fact, where such thermal conditions exist, the mortality rate is virtually doubled. (An excessively hot environment is defined as one where either the dry-bulb exceeds $37,0^\circ\text{C}$ or the wet-bulb exceeds $32,5^\circ\text{C}$.)

The origin of heat stroke is multi-factorial. The main causal factors therefore constitute an interaction of strenuous work, suspect heat tolerance, excessively hot environments and concurrent dehydration. General complacency is the single most important root cause, an observation substantiated by the fact that the relative incidence of the major causal factor totals 215 percentage points (Table 1.1).

On the basis of the above analysis, a basic framework can be derived for work practices in 'hot' environments, irrespective of whether such heat loads are associated with surface, opencast or underground operations. This framework is presented below (Table 1.2).

2. Heat Acclimatisation and its Retention: Implications for HSM Work Practices:

The degree of heat acclimatization ultimately achieved is a function of metabolic work rate, the environmental heat load, exposure time and exposure time repetitions. During this period, susceptibility to heat disorders is inherently higher and **'formal supervision'** is an essential element of the acclimatization process in order to ensure that all precautions are in place and observed.

Secondly, under controlled conditions full heat acclimatization can be achieved within less than a week. Conversely, a substantial and critical loss of heat acclimatization can take place within a few days' absence from work in hot environments. Therefore, with the introduction of new shift systems or extended surface training, scenarios exist where full heat acclimatization may remain suboptimal. Under such circumstances, or where

the slightest risk of incomplete heat acclimatization exists, it follows that recommended work practices should be retained permanently.

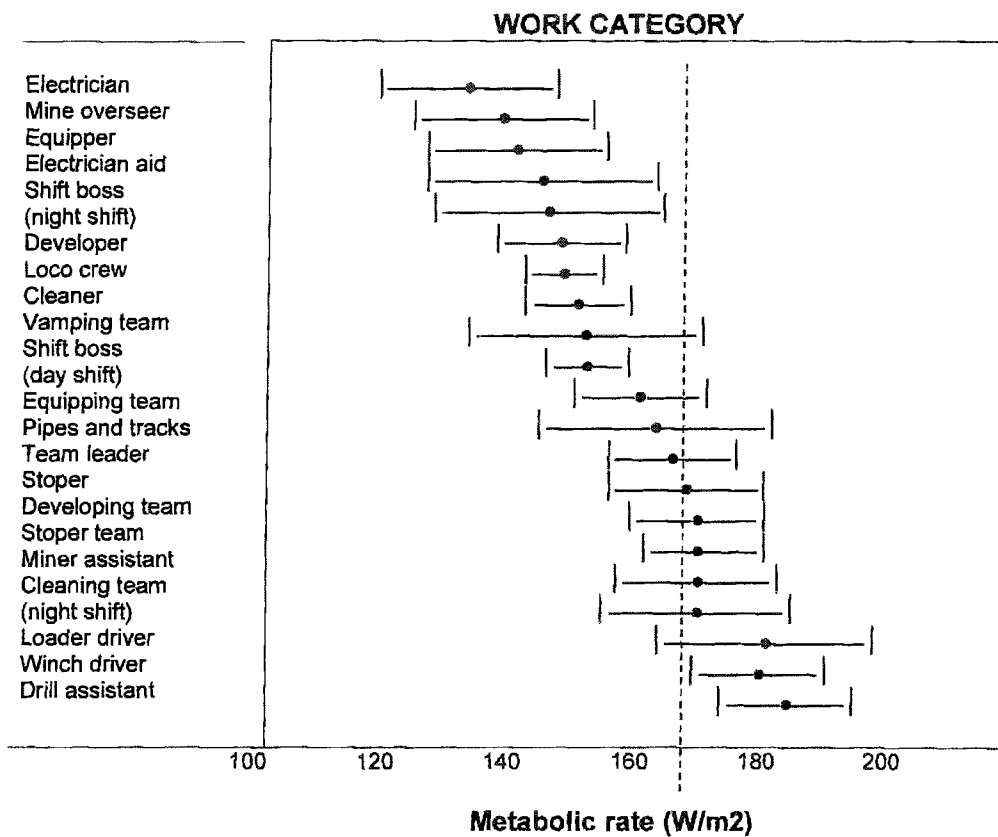
TABLE 1.2: Framework for HSM work practices on the basis of the most important casual factors in the development of heat stroke

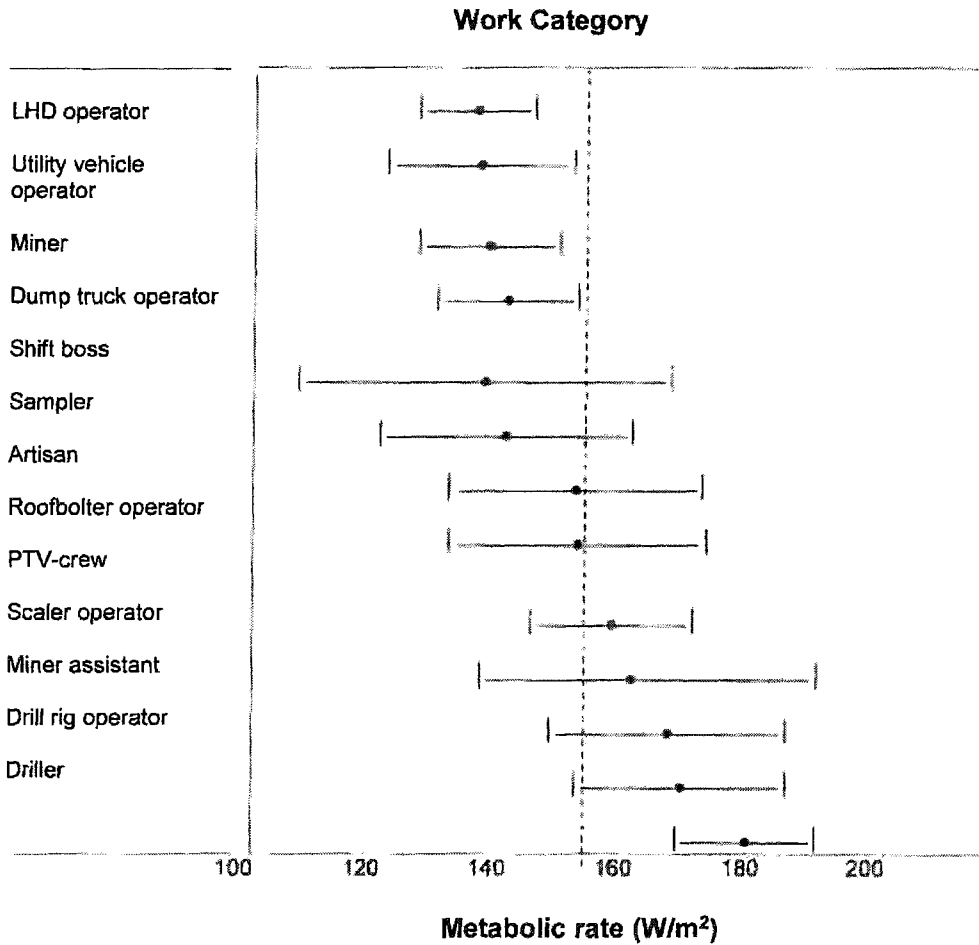
CAUSAL FACTOR	WORK PRACTICE
Strenuous work	<ul style="list-style-type: none"> • Adequate physical work capacity (physical evaluation) • Self-pacing (educational) • Work-rest cycles (administrative and mandatory, if required)
Suspect heat tolerance	<ul style="list-style-type: none"> • Overall fitness for work in hot environments: <ul style="list-style-type: none"> ○ Medical evaluation ○ Physical evaluation ○ Screening for heat intolerance
Dehydration <ul style="list-style-type: none"> • Alcohol-induced • Insufficient fluid replacement 	<ul style="list-style-type: none"> • Education • Provide potable and palatable water at place of work • Introduced water-breaks
Excessively hot environments	<ul style="list-style-type: none"> • Ongoing monitoring and control • Action plans • Emergency planning

A third perspective is that high levels of inherent or acquired heat tolerance do not provide any unequivocal guarantee against the development of heat disorders, including heat stroke, if basic precautions are not observed. Also, in this respect, therefore, there can be no justification for relaxing work practices simply on the outdated notion that full heat acclimatization confers immunity against heat disorders: **work practices applicable to the formality of heat acclimatization are equally applicable once an adequate degree of heat acclimatization has been achieved.** The only dispensation is that, the need for 'close supervision' could be lessened and even discontinued for routine work, provided a form of informal supervision can be established through good education and awareness retention monitoring, for example through the so-called buddy system, in conjunction with self-care, which is an implicit and explicit requirement under the new Mine Health and Safety Act.

Finally, while employees routinely exposed to work in heat on a day to day basis are likely to develop significant levels of heat acclimatization, some others will remain unacclimatized by virtue of the intermittent exposures associated with a particular work category. Examples can be drawn from senior management, human resources practitioners, etc. If medically and physically cleared to enter 'hot' environments in the execution of their normal duties and responsibilities, **such employees, irrespective of status or seniority, should only be permitted to do so under close supervision and while adhering fully to mine standards or codes of practice.**

FIGURE 1.1: Metabolic work rates with 95% confidence limits related to conventional mining work categories





3. Safe Work Practices and Supervision

From Sections 1 and 2 it should be clear that two main scenarios exist for the application of safe work practices.

- * 'Close supervision' implies supervision taking place under the direction of a specially appointed person whose authority in upholding mine health and safety standards should exceed the dictates of production. It follows that such a person should have qualifications in mining and in health and safety matters, as well as considerable experience. Close supervision applies to:

- Employees undergoing formal heat acclimatization, irrespective of the precise circumstances necessitating heat acclimatization,
 - Any employee of the company who by virtue of his/her job or position only intermittently and irregularly enters 'hot' environments in the routine execution of his duties, and who has been medically and physically cleared to do so, and
 - Visitors or company officials who only enter 'hot' environments on special occasions and who, as a matter of course, have not been cleared either medically or physically to enter such areas.
- 'Informal' supervision is the responsibility of all levels of line management (mine overseer, shiftboss, team leader, etc.) and applies only to routines where employees have already achieved a satisfactory degree of heat acclimatization; more precisely, it excludes all of the contingencies listed under 'close supervision'.

Safe work practices, irrespective of the level of supervision comprise

- Monitoring work place wet- and dry-bulb temperatures on a basis designed to ensure that safe limits are not exceeded and to detect the development of possible trends; whirling hygrometers, checked in terms of acceptable standards, or any other suitable instrumentation, may be used,
- Checking employees for overt signs of ill health or substance abuse and removing such persons from the place of work for attention appropriate to the situation,
- Ensuring that acceptable work rates are maintained in order to avoid the early onset of fatigue; this would be achieved through work-rest cycles (10 to 15 minutes rest in every hour) where work is of necessity strenuous and ongoing (e.g. drilling) or by instilling, through constant reminders, a sense of self-pacing,
- Ensuring that fluid replacement beverages (preferably only water or hypotonic fluids) are available at the place of work and that a fluid replacement regimen of at least 2 x 250 - 300 ml per hour is observed.
- The detection of early signs and symptoms of heat disorders and instituting proper remedial action depending on the precise set of signs and symptoms.
- Ensuring that emergency treatment and communication facilities are available and fully functional on a daily basis, and
- Setting into motion purpose-developed emergency action plans in the event of sudden escalations in environmental temperatures.

The above work practices, which should in any event be adopted as standard routine, are especially relevant to employees who return to work after a period of absence, irrespective of duration or reason. In this regard, it should be noted that some industries, e.g. American nuclear power plants, subscribe to a programme of

progressive exposure to achieve heat acclimatization, for example, the permissible exposure on the first day is limited to 50 % of a full shift's exposure, and on successive days, respectively to 75 and 90 % (Bernard et al, 1986).

ANNEXURE 8*(For information only)***1. Absenteeism from Routine Work in 'Hot' Environments**

The two categories catering for absenteeism from work in 'hot' environments are

- Absenteeism associated with any form of vacation leave or the attendance of conferences and training courses, etc., and
- Absenteeism due to illness or injury.

With regard to the former, the general recommendation is that the employee bypasses HTS and resumes normal work under close supervision for the designated period. The only exception is where, following annual leave, the outcome of a routine medical/physical examination necessitates HTS (see Annex 5 "Medical/Physical Examinations", Annex 5 is for information only). The period of absenteeism is immaterial provided the employee does not fall ill during this period of absenteeism. Should this occur, the mine medical officer should be consulted. HTS may be required at any time at the discretion of the mine medical officer, depending on circumstances. Also, formal supervision must be in place to accommodate returning employees.

Absenteeism due to illness, especially febrile disease, makes HTS mandatory before resuming routine work under close supervision. Following physical injury and prolonged inactivity during recovery, HTS should, once again, be mandatory. However, the mine medical officer may exercise his discretion in the event of minor injuries which would not influence overall physical fitness for work in heat.

ANNEXURE 9*(For information only)***WATER AND NUTRITIONAL REQUIREMENTS DURING WORK IN HEAT****1. Maintenance of hydration: fundamental considerations**

Sweat is produced solely to provide water for evaporative heat dissipation. Despite this thermoregulatory benefit, profuse sweating may lead to dehydration and as such constitutes a potential threat to continued normal body function. The reason is plain: sweat production is ultimately dependent on an adequate intake of water.

Dehydration leads to a reduction in the circulating blood volume. Inasmuch as the circulation is charged with heat transfer from the body core to the skin, thus facilitating convective and radiative heat loss, heat dissipation is compromised also as a consequence of inadequate heat transfer. In an effort to maintain an adequate circulation through the skin under these circumstances, the body reduces the flow of blood to non-vital tissues and organs (e.g. the gut) through constriction of blood vessels (vasoconstriction). Blood volume is reinstated, albeit in a relative sense only.

Compensatory vasoconstriction in response to dehydration commences at water deficits of between 1 and 2 per cent of body mass, i.e. at water deficits as low as 0, 7 litre in a 70 kg man. Since the gut is the primary organ in which compensatory blood vessel constriction occurs, it follows that water absorption will be reduced most drastically. This implies that dehydration may remain largely uncorrected irrespective of the amount of fluid subsequently ingested. It should be stressed in this context that drinking water according to the dictates of thirst is not sufficient to prevent voluntary dehydration, a finding which suggests that the thirst mechanism is not a reliable and sensitive indicator of the state of hydration. Moreover, the alleviation of thirst, and cessation of drinking, does not necessarily reflect rehydration but rather the subjective sensation of stomach fullness.

The psychological effects of dehydration are as dramatic as the physiological ones. Discipline is poor and aggressive attitudes become prominent. Such men are morose and morale is impaired. Fatigue sets in sooner than is normally the case. In short: productivity and safety are in severe jeopardy, as a result of dehydration.

Under conditions designed to simulate moderate work in a mining environment, typical fluid losses as a result of sweating could approach 1 litre within the first hour. It would therefore be advisable to initiate a fluid replacement regimen well in advance of the onset of this critical period. An ideal to strive for seems to be about 500 ml every 20 to 30 minutes. The water should be cool (about 15°C), palatable and of good quality (potable).

2. Form of Fluid Replacement

The form of fluid replacement is, and remains, a subject of controversy. This is surprising since first principles suggest that the form of replacement should be determined precisely by what is lost, i.e. sweat.

Sweat is watery fluid which contains considerably less solid matter than the body fluids from which it is derived. It is, therefore, hypotonic with regard to body fluids. Quantitatively the most important constituent is sodium chloride ('salt') which varies in concentration from about 0,1 to 0,3 g per 100 ml of sweat, as opposed to a value of about 0,9 g per 100 ml of body fluid.

The two most prevalent misconceptions are, firstly, that sweat has the same composition as body fluids (i.e. the same tonicity) and that fluid replacement should, consequently, be achieved by so-called isotonic beverages, and secondly, that the body loses vast amounts of salt during sweating, hence the practice of salt supplementation through tablets and salted drinks. Thus, considering the composition of sweat as outlined above, it should be patently clear that there is no justification for the use of isotonic fluids or salt tablets.

Of further relevance is to point out that, although some form of salt replacement is indicated following prolonged and profuse sweating, pronounced salt depletion is nevertheless unlikely. The reason is that most adults following Western dietary customs consume more than 20 times the requirements of the body on a daily basis. In fact salt supplementation constitutes a physiological hazard: in countries where salt intake is high, a statistical link exists between it and the incidence of hypertension. Even the immediate effect of salt supplementation in tablet form is manifested in overt circulatory strain.

A study conducted on 400 medically screened recruits to the South African mining industry (Kielblock, 1987) revealed that:

- a) Relative to commercially available hypo-, iso- and hypertonic fluid replacement beverages, water is the preferred form and that the benefits are in terms of significantly lower rectal temperatures after four hours' work in heat,
- b) Increased tonicity has a detrimental effect which, ironically, is curbed by a lower voluntary intake but which is aggravated by force-feeding, an observation ascribed to poor gastric emptying.

3. Nutritional requirements for energy replacement

The maintenance of an optimum state of hydration is not the only prerequisite to continued physical effort in hot humid environments. Equally important is the sustained generation of energy, a process achieved by the combustion of the two principal metabolic fuels, namely carbohydrate, in the form of glucose, and fat, in the form of fatty acids.

Considering total body economics, fat has the advantage of being a more compact form of energy; it can also be stored in vast quantities, e.g. as in obese individuals. In contrast, carbohydrates are poorly stored (about 0,5 to 1,0 per cent of body mass), but have the decided advantage of being able to sustain intense short-term activity. While neither fat nor carbohydrate is inherently inefficient as an energy source, a progressive

increase in physical activity is characterised by a concomitant shift from fat to carbohydrate as the predominant source of energy.

Carbohydrate depletion during sustained intense physical effort constitutes a serious limitation to continued activity. This may already become evident within four hours following the commencement of the shift, an event considered to be physiologically deleterious. Impaired work performance is, therefore, attributed to carbohydrate depletion as a result of a man's sporadic eating habits.

Against this background it should be obvious that from a nutritional point of view certain prerequisites exist. These have been enumerated as:

- (a) a generous carbohydrate-rich meal at the end of a shift in order to replenish body stores,
- (b) a light carbohydrate meal immediately prior to the shift which, although in itself inadequate in the absence of the previous night's meal, is much more tolerable when embarking on any form of physical exertion, and
- (c) a mid-shift feed comprising an acceptable tasty fluid meal containing mainly carbohydrate. An added benefit of the latter is that it serves also as an additional form of fluid replacement.

In summary: continued physical work in hot humid underground environments is a function of heat dissipation and the availability of an appropriate metabolic fuel.

ANNEXURE 10
(For information only)

EMERGENCY WORK IN ABNORMALLY 'HOT' ENVIRONMENTS - UNDERGROUND

1. Introduction

Where wet-bulb temperatures exceed 32,5°C, no routine work should be undertaken. Only emergency work, essentially directed at re-establishing an acceptable thermal environment, should be undertaken.

This document is intended to provide a framework for the formulation of guidelines for the protection of employees who, as a result of an emergency of one kind or another, are likely to be exposed to excessively hot environments. Where relevant, some background is given in an effort to provide further guidance. These guidelines are based on the findings of SIMRAC Project GAP 045.

2. Application of this Annexure

Operations normally covered by mines' code of practice dealing with work in conditions conducive to heat stroke are excluded because such work is deemed to be 'routine'. These guidelines apply to emergency (non-routine) work only and embrace all mines, including those generally held to be 'cool' (i.e. wet-bulb temperature of <27,5°C with the dry-bulb not exceeding 37,0°C) and where the prescriptions of regulation 9.2(1) do not apply.

Secondly, many mines have standards in respect of emergency work in hot environments. These standards are mine-specific and the present guidelines should, therefore, be viewed as complementary and not necessarily as superseding existing in-house standards or managerial instructions. However, in absence of any such standards, these guidelines should be interpreted as representing a minimum requirement.

The guidelines presented are based on sound investigation and the data have been subjected to rigorous statistical analysis. The basic approach in establishing tolerance times has been conservative, which permits the degree of flexibility required to translate controlled laboratory simulations into practical application. Therefore, in the interest of practicability and convenience, slight discrepancies exist between the original experimental findings and the recommendations contained in the guidelines.

3. Assessment of the Environment

In the interests of simplicity it is suggested that action levels be based on wet- and dry-bulb temperatures using a whirling hygrometer or any other suitable instrumentation. It is accepted that whirling hygrometers have a number of drawbacks (e.g. cumbersome to use, fragile, not always easy to read) but at present there are no alternatives which combine easy read-out capabilities, accuracy and mine-worthiness. Sophisticated instruments, also measuring mean radiant temperature and air speed, as well as converting these measurements to various indices, are not required.

The environmental heat load is expressed as the arithmetic mean of the dry- and wet-bulb temperatures, i.e. an index which has its origins in the Israeli Discomfort Index (DI), but which has been substantially modified to what is now termed the Emergency Heat Stress Index (EHSI).

In calculating the EHSI it is recommended that all fractions of a degree be rounded up. For example, if:

$$\begin{array}{llll} \text{dry-bulb} & = & 38,2^{\circ}\text{C} & \text{then} & \text{EHSI} & = & (39 + 35)/2 \\ \text{wet-bulb} & = & 34,5^{\circ}\text{C} & & & = & 37^{\circ}\text{C} \end{array}$$

4. Special Precautions

4.1 Supervision

Any operation regarded as 'non-routine' or as an emergency, and complicated by heat, should be undertaken only under direct supervision of line management. The responsible person thus appointed, with whom the responsibility for the implementation of these guidelines and/or the relevant mine standard should be vested, should be assisted in his decisions by the environmental control manager/supervisor, and he should be well versed with respect to the health and safety of employees under his control.

An important element is that of observing recommended precautions, as well as the early detection of the onset of fatigue and heat disorders. Proper instruction is, therefore, indicated during operations.

4.2 Selection of the task force

The task force should consist only of employees who have been screened or tested for heat tolerance or acclimatised to work in heat, by conventional climatic chamber procedures or by natural underground acclimatisation, and who have rested since the previous shift. Apparent signs of alcohol over-indulgence represent a serious contra-indication, as would also apply in the case of incipient illness or where individuals are under medication which would increase susceptibility to premature fatigue or heat disorders. Mine medical officers or qualified medical station personnel should be available to assist in the final selection process.

4.3 Assessment of the task and general awareness

Work rates cannot be prescribed or limited where emergency work has to be undertaken, especially where life is at stake. However, in the assessment of the physical demands likely to be imposed, it would be essential to impress on workers the importance of self-pacing to avoid the onset of severe fatigue. Once this happens it is virtually impossible to recover substantially while still faced with high environmental heat loads. Reinforcing an awareness of the potential hazards associated with a particular task is, therefore, fundamentally important. Induction appropriate to

conditions likely to be encountered is, similarly, essential.

A distinction is warranted between, on the one hand, non-routine or emergency work undertaken by qualified mine personnel and on the other hand, operations which by their very nature can only be undertaken by rescue brigadesmen. It is a fallacy to argue that brigadesmen, because of their high selection and training standards, are necessarily superior to general workers when exposed to high environmental heat loads. Brigadesmen operations almost invariably require full dress (overalls), which significantly impede heat dissipation, while the relatively heavy and cumbersome breathing apparatus presents a further burden irrespective of its advantage. Also, with a full mask brigadesmen may have difficulty in observing water breaks and a prior intake is, therefore, advisable. Although these guidelines are not irrelevant to Rescue Brigadesmen operations, they are not intended to govern such operations at present.

4.4 Infrastructure

The key infrastructure and organisational requirements are:

- (a) Ensuring drinking water is made available at the place of work and that regular water breaks are observed, e.g. 350 -500 ml of water every 30 minutes,
- (b) The availability of emergency body cooling facilities, and
- (c) Standby medical staff.

Any employee showing early signs of heat disorders, notably behavioural changes, but also premature fatigue, muscle cramps, nausea, vertigo or more advanced signs associated with heat exhaustion and heat stroke, should be removed to cool areas immediately and treated accordingly.

4.5 Complicating factors

While the emphasis falls on heat in the present context, cognisance should be taken of other aggravating factors, e.g. carbon monoxide and oxygen deficiency, as well as other gases or toxic fumes. Appropriate gas detection instrumentation should be issued and, in case of very dense smoke, eye protection would be necessary. (It may also be necessary to consider establishing a cache of self-contained self-rescuers). Travelling times could be affected significantly in cases of low visibility or where difficult, or demanding, routes have to be negotiated. Alternate escape routes, where in existence, should, therefore, be identified beforehand.

5. Action levels and permissible exposures

5.1 Action levels

At an EHSI of above 28°C no emergency work should be undertaken unless by inherently heat tolerant or acclimatised employees. This would apply to mines, or sections of mines where the conditions are not generally conducive to heat stroke. Where conditions are conducive to heat stroke an action level of 30°C EHSI is

proposed for emergency operations, the rationale being to introduce better control to cater for unexpected conditions and to take into account cumulative effects.

The maximum permissible upper limit is set at 45°C (EHSI units). Experimental subjects are generally incapable of exerting themselves under these conditions and estimates of tolerance times become too unreliable to make further projections because of the lack of statistically meaningful data.

In summary, the recommended action levels are as listed below:

EHSI□28°C: emergency work to be undertaken only by heat tolerant or heat acclimatised task forces; no time limits are proposed but work should proceed under supervision and with regular water breaks.

EHSI□30°C: special precautions (see section 4) and tolerance times (see Table 1) are to be observed.

EHSI□45°C: maximum permissible upper limit, no work should be undertaken unless whole body cooling is feasible.

5.2 Body cooling garments

The benefit conferred by body cooling garments suggests that, at EHSI values of 40°C and below, tolerance times can be extended by about 30 minutes. This reduces quite sharply above and EHSI of 40°C and the maximum recommended extended time should not exceed 20-25 minutes.

Although it could be argued that these benefits are not substantial in terms of the investment, the extent of protection may well be crucial from a survival point of view. A further consideration is that the well-being and safety of an entire team could be jeopardised by the premature collapse of any single member.

It is proposed that, where available, body cooling garments be worn in order to provide added protection, especially where conditions cannot be predicted or change unexpectedly. **Mines are advised to confer with the Manager, Occupational Hygiene, CSIR: Mining Technology with regard to choice.**

5.3 Tolerance times

The tolerance times are presented in Table 1 of these guidelines and from a convenience and practical point of view, presented in 10-minute intervals for 'moderate' and 'hard' work, respectively.

A complication arises when temperatures increase because initial estimates of tolerance times have to be reduced to take into account the added heat load. Inasmuch as exposure up to that particular stage, even if of a lower magnitude, cannot be discounted, it is obvious that the new tolerance time has to be adjusted downwards from the limit actually recommended for that EHSI level. The following

example illustrates a hypothetical case. A moderate work rate is assumed throughout the entire operation.

At start of operation:		
Dry-bulb temperature	=	32°C
Wet-bulb temperature	=	28°C
EHSI	=	(32 + 28)/2
	=	30°C

The recommended limit for an EHSI level of 30°C is 230 minutes (Table 1) and this includes travelling time, assuming environmental conditions remain constant.

At point of entry to area of work

Elapsed travelling time	=	20 minutes
Available operational time	=	230 - total travelling time
	=	230 - (20 x 2)
	=	190 minutes

In other words, if the environmental heat load remains constant following entry to the area of work, the available operational time is 190 minutes.

Following entry to the area of work it was established that the environmental heat load had increased:

Dry-bulb temperature	=	38°C
Wet-bulb temperature	=	34°C
EHSI	=	(38 + 34)/2
	=	36°C

The recommended time for an EHSI level of 36°C is 90 minutes. However, travelling time must be taken into account and an equitable 'penalty' derived. Inasmuch as the respective EHSI levels and corresponding tolerance times constitute equivalent 'doses' (i.e. identical risks of $<10^{-3}$ to reach rectal temperature of 39,5°C), the penalty could be expressed in terms of dose.

In the present example travelling time to the area of work amounted to 20 minutes. On the assumption that the return journey would also take 20 minutes under identical conditions, the dose from travelling can be estimated as follows:

Dose	=	Actual exposure / Permissible exposure
	=	Total travelling time / Permissible exposure
	=	40 / 230
	=	0,1739
	=	17%

This implies that the available dose at the higher EHSI level of 36°C would have to be

penalised by the dose incurred as a result of travelling to and from the area of work. This dose amounts to 17 % and, consequently, the available dose amounts to 83 % of the total permissible tolerance time, therefore:

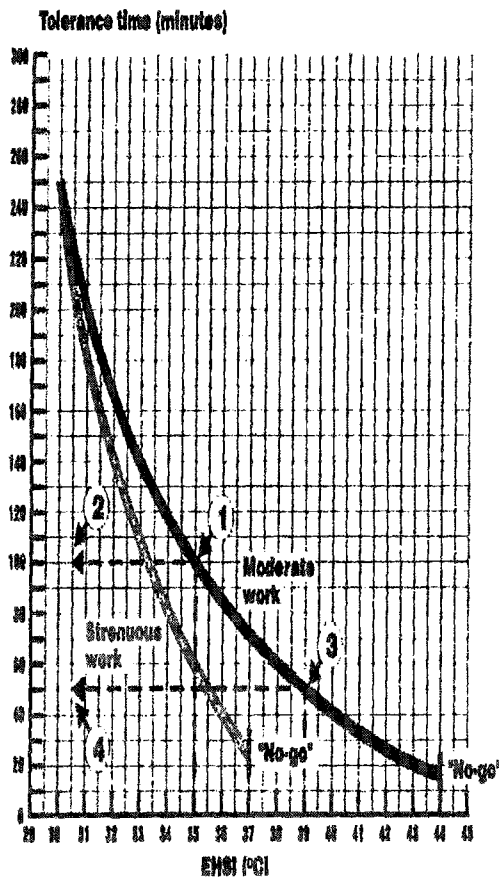
$$\begin{aligned} \text{Available operational time} &= \text{Permissible tolerance time} \times 0,83 \\ &= 90 \times 0,83 \\ &= 74,7 \\ &= 75 \text{ minutes} \end{aligned}$$

Although the calculation is straightforward, practical problems are likely to be experienced under most emergencies, especially since instrumentation to facilitate rapid calculation is not available at present. To overcome this problem a pocket-sized quick reference chart has been provided. Figures 1 and 2 below give examples of such a reference chart.

FIGURE 1: Emergency work schedules without body cooling garments

**EMERGENCY WORK SCHEDULES
WITHOUT BODY COOLING GARMENTS**

Note: see reverse for instructions



OBVERSE

INSTRUCTIONS

STEP	EXAMPLE	Graph ref.
1 Calculate EWB $EWB = (DB + WB) / 2^{\circ}C$	Dry-bulb (DB) = 40°C Wet-bulb (WB) = 30°C EWB = $(40 + 30) / 2$ = $(70 / 2)$ = 35°C	1
2 Estimate actual/anticipated work rate: • moderate: self-paced/comfortable • strenuous: conscious effort/effort	Estimated work rate = moderate	
3 Record corresponding tolerance time from referral graph	Tolerance time (e.g. for moderate work) = 100 minutes	2
4 Record time at start of operation	Starting time = 1145	
5 Monitor EWB and work rate	New EWB = 39°C New tolerance time = 90 minutes	3 4
6 No-adjust tolerance time if perceptible changes occur • Estimate elapsed time = Elapsed time since start* original tolerance time * e.g. 20 minutes • Calculate available time = 1 - elapsed time • Calculate available operational time = new tolerance time x available time EWB of 39°C	Elapsed time since start = 20 minutes Elapsed time = $20 / 10$ = 0,2 Available time = $1,0 - 0,2$ = 0,8 Available operational = $90 \times 0,8$ tolerance time of new EWB of 39°C = 48 minutes	
7 Monitor and re-adjust if indicated Steps 5 - 6		

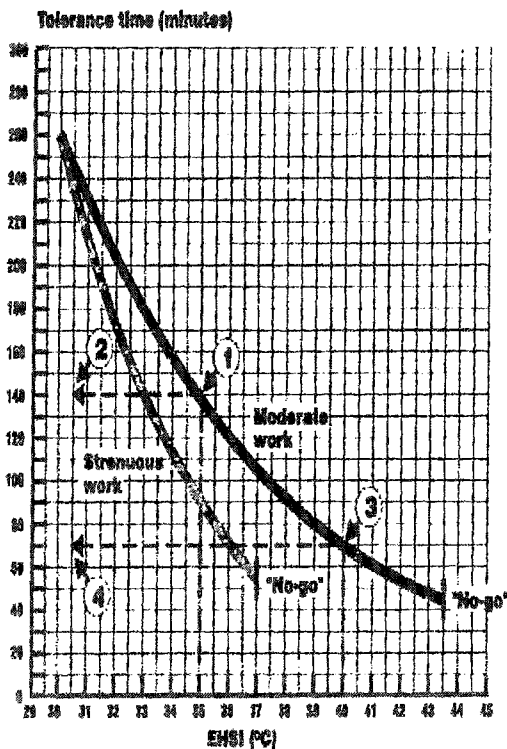
REVERSE

FIGURE 2: Emergency work schedules without the use of body cooling

garments: facsimile of quick reference card

EMERGENCY WORK SCHEDULES WITH BODY COOLING GARMENTS

Note: see reverse for instructions



OBVERSE

INSTRUCTIONS

STEP	EXAMPLE	Graph ref.
1 Calculate EHSI EHSI = (WB + WB) / 2°C	Dry-bulb (WB) = 40°C Wet-bulb (WB) = 30°C EHSI = (40 + 30) / 2 = (70) / 2 = 35°C	1
2 Estimate actual/anticipated work rate: • moderate: self-paced/easily maintainable • strenuous: conscious effort/difficult	Estimated work rate = moderate	
3 Record corresponding tolerance time from relevant graph	Tolerance time (e.g. for moderate work) = 240 minutes	2
4 Record time at start of operations	Starting time = 1145	
5 Monitor EHSI and work rate	New EHSI = 40°C New tolerance time = 70 minutes	3 4
6 Re-adjust tolerance time if perceptible changes occur • Estimate elapsed dose = Elapsed time since start / original tolerance time • e.g. 20 minutes • Calculate available dose = 1 - elapsed dose • Calculate available operational time = new tolerance time x available dose	Elapsed time since start = 20 minutes Elapsed dose = 20/240 = 0,15 Available dose = 1 - 0,15 = 0,85 Available operational time = 70 x 0,85 tolerance time at new EHSI of 40°C	
7 Monitor and re-adjust if indicated Steps 5 - 6		

REVERSE

It is equally clear that the mental arithmetic associated with the calculation of 'dose' in order to re-assess tolerance time under conditions where thermal conditions deteriorate, would be even more daunting. Consideration should, therefore, be given to 'estimated dose' where convenient fractions are used, e.g. 25, 50 and 75 %. Using the above example, the following estimates would be obtained.

Elapsed dose	=	40/230	=	20%
Available dose	=	200	=	100-20
			=	80%
Available operational time	=		=	80% of 90 minutes (or 0, 8 x 90)
			=	72 minutes

The principle proposed is, therefore, that any convenient fraction (i.e. single decimal figures) be used when reassessments of tolerance time are indicated.

TABLE 1: Tolerance times for various EHSI levels with and benefit of Body Cooling Garments (BCG)

EHSI ¹	TOLERANCE TIME (MINUTES)			BCG BENEFIT	
	EXPERIMENTALLY DETERMINED ²	RECOMMENDED LIMIT ²			
		MODERATE	STRENUOUS		
28–	-	No limit	No limit	Not applicable	
29,9	227	230	230		
30	200	200	180		
31	174	175	140		
32	150	150	110		
33	128	130	85		
34	108	110	60		
35	91	90	40		
36	75	70	25		
37					
38	61	60	No work	+30	
39	50	50			
40	40	40	Evacuate area		Maximum of 20–25 minutes
41	33	30			
42	27	30			
43	24	20			
44	22	20			
45	21				

¹ Emergency Heat Stress Index = (dry-bulb + wet-bulb in C)/2

² Recommended limits are based on experimentally determined limits but rounded up in the interests of convenience to cater for respectively, "moderate" (self-paced, i.e. working at a comfortable rate) and "strenuous" work (i.e. where effort is apparent, e.g. transporting heavy materials without a break, climbing up steeply inclined sections).

DEPARTMENT OF MINERAL RESOURCES

NO. R. 147

05 FEBRUARY 2016

MINE HEALTH AND SAFETY ACT, 1996 (ACT NO 29 OF 1996)**GUIDELINE FOR A MANDATORY CODE OF PRACTICE ON THE
MINIMUM STANDARDS OF FITNESS TO PERFORM WORK ON A MINE**

I **DAVID MSIZA**, Chief Inspector of Mines, under section 49 (6) of the Mine Health and Safety Act, 1996 (Act No. 29 of 1996) and after consultation with the Council, hereby issues the guideline on the minimum standards of fitness to perform work on a mine in terms of the Mine Health and Safety Act, as set out in the Schedule.



DAVID MSIZA

CHIEF INSPECTOR OF MINES

SCHEDULE

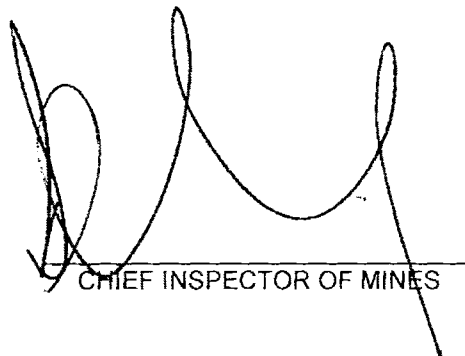
Reference Number: DMR 16/3/2/3-A3
Last Revision Date: 30 June 2013
Date First Issued: 01 March 2003
Effective Date: 30 June 2016

DEPARTMENT OF MINERAL RESOURCES

MINE HEALTH AND SAFETY INSPECTORATE

**GUIDELINE FOR THE COMPILATION OF A
MANDATORY CODE OF PRACTICE ON THE**

**MINIMUM STANDARDS OF FITNESS
TO PERFORM WORK ON A MINE**



CHIEF INSPECTOR OF MINES



mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

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PART A: THE GUIDELINE

1. INTRODUCTION

- 1.1 This guideline has been drafted to assist **OMPs** in determining fitness to perform specified work at a mine or entity that reports under Mine Health and Safety Act (Act 29 of 1996) as amended, or to continue to perform such work.
- 1.2 This guideline outlines the most common approaches to be followed by the **OMP** to determine fitness-to-work of an employee suffering from a medical condition of a bodily system. It should however be noted that the approaches described within this guideline are not meant to be too prescriptive and **OMPs** should be allowed to introduce other approaches for evaluation of fitness to work as long as such approaches are supported by evidenced-based medical trials or by the appropriate medical associations e.g. South African/ American Thoracic Society, etc.
- 1.3 Legislation (**MHSA/ EEA**) requires that for every job for which a fitness-to-work medical examination is done is to have specific minimum health standards in relation to the essential functions of such a job. An **OMP** is responsible for executing fitness-to-work medical examinations and must ensure that he/she is familiar with the specific physical and mental requirements of each job for which he has to issue a fitness to work certificate.
- 1.4 Templates are provided as an Annexure for guidance on identifying possible risks and hazards associated with certain diseases and conditions. These are however not absolute guidelines, and they could be implemented as such.

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 or safety of employees and other persons who may be directly affected by activities at the mines if the Chief Inspector of Mines requires it. These **COPs** must comply with any relevant guideline issued by the Chief Inspector of Mines (section 9(3)). Failure by the employer to prepare or implement a **COP** in compliance with this guideline is a contravention of the **MHSA**.

3. THE OBJECTIVE OF THIS GUIDELINE

- 3.1 The objective of this guideline is to assist the employer charged with the task of preparing a **COP** which, if implemented and complied with, would:
 - 3.1.1 be appropriate, considering the health and safety of all employees at the mine;
 - 3.1.2 ensure the employee is fit to perform that employees' work at the mine;
 - 3.1.3 ensure that the health of the employee who is certified as fit for a specific job is such that the employee will be able to perform that work without an unacceptable health or safety risk to that employee or any other person;

- 3.1.4 establish a baseline against which to measure subsequent changes in the health status of the employee; and
- 3.1.5 ensure compliance to obligations as prescribed in other relevant labour legislation (LRA; EEA; BCEA) and relevant COPs.

4. DEFINITIONS AND ACRONYMS

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

“COP” means Code of Practice.

“DMR” means the Department of Mineral Resources.

“MHSA” means Mine Health and Safety Act, 1996 (Act No. 29 of 1996) as amended.

“OMP” means Occupational Medical Practitioner.

“EEA” means Employment Equity Act (Act 55 of 1998).

“LRA” means Labour Relations Act (Act 66 of 1995).

“BCEA” means Basic Condition of Employment Act (Act 75 of 1997).

“OREP” means Occupational Risk Exposure Profile.

Health impact assessment (HIA) means the provision of information about how any policy, program practices and exposures may affect the health of a population, and the distribution of those effects within the population.

The social model means a model that concentrates on the person as a valued member of a very diverse society. It suggests that the disabled person is a unique individual who has the right to the same opportunities in housing, education, transport and facilities as anyone else. The solution according to this model is to bring about attitudinal, environmental and organisational changes within present day society. It is felt that disabled people need to be encouraged to play an equal part in decision making processes, particularly when the decisions affect them personally.

Medical model means a model that in the terms cited by psychiatrist Ronald D. Laing for the "set of procedures in which all doctors are trained." This set includes complaint, history, physical examination, ancillary tests if needed, diagnosis, treatment, and prognosis with and without treatment. This does not allow the person affected to have any say in the decision of fitness to work.

“**Strenuous work**” means physically and demanding tasks combined with extended hours of work where the work rate exceeds 160 W.m⁻²

5. SCOPE

- 5.1 This guideline covers a basic approach for the **OMP** advising on minimum standards of fitness to perform work at a mine.
- 5.2 This guideline does not stipulate specific advice on every medical condition. However, conditions not dealt with in the guideline, which could have an impact on health or safety, should also be taken into account when determining an employee's fitness to perform work. The hazard identification and risk assessment approach contemplated in the **MHSA** should be applied to fitness to perform work at a mine.
- 5.3 The **OMP** conducting the medical examination should be satisfied in each case that no disease or impairment is present which could either be significantly aggravated by working at a mine or represent an unacceptable health or safety risk to any person.

6. MEMBERS OF THE TASK GROUP

6.1 Principal drafting members

- Dr Chris de Beer Occupational Medicine Practitioner and Certified Professional in Medical Incapacity and Disability Management
- Dr Andre du R Louw Occupational Medicine Practitioner

6.2 Additional drafting members

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- Mr Lukas Coetsee Attorney of Law
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6.4 System specialists consulted

- Prof James Kerr Specialist Physician
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- Dr Helena Oosthuizen Endocrinologist
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- Dr S Fatmi Neurosurgeon

6.5 State member

- Dr L Ndelu Chief Directorate: Occupational Health
- Dr D Mokoboto Medical Inspector

6.6 Employer member

- Dr K Baloyi

6.7 State

- Mr. A Letshele

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-reference. 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 guideline 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, 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 Name of the mine;
- 1.2 The heading: "Mandatory Code of Practice for Minimum Standards of Fitness to Perform Work at a Mine";
- 1.3 A statement to the effect that the **COP** was drawn up in accordance with **DMR** reference number **DMR 16/3/2/3-A3** issued by the **CIOM**;
- 1.4 The mine's reference number for the **COP**;
- 1.5 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 COP

Under this heading the **COP** must contain statements to the effect that –

- 3.1 the **COP** was drawn up in accordance with Guideline **DMR** reference number **DMR 6/3/2/3-A3** issued by the **CIOM**;
- 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 code 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 and 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 should include competent persons sufficient in number to effectively draft the **COP**.

5. GENERAL INFORMATION

Relevant information relating to the mine must be stated in this paragraph. 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/mineral excavation processes;
- 5.4 a description of the systems in use on the mine to determine, implement and monitor minimum standards of fitness to perform work at the mine; and
- 5.5 other relevant **COPs**.

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 7 and 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, consider the capabilities of employees in respect of health and safety, record the significant hazards identified and risks assessed and develop medical standards for each job on the mine. The employer must determine how the significant risks identified in the risk assessment process must be dealt with.
- 7.2 To assist the employer with the risk assessment all possible relevant information such as accident statistics, ergonomic studies, research reports, manufacturers specifications, approvals, design criteria, performance figure for all relevant equipment, medical condition/disease impacts, etc. should be obtained and considered.
- 7.3 The existence of a medical condition with the likelihood of precipitating an acute illness or medical emergency is of particular concern in a mine, given that evacuation may entail a delay in providing treatment, and may put the health or safety of that individual or that of others at risk. The risk of an adverse outcome in the case of acute illness must be seen in the context of the particular mine/ entity in which an

employee works. For example, evacuation from deep level and open cast mines would not result in the same delays or risks

- 7.4 In addition to the periodic review required by section 11(4) of the **MHSA**, the **COP** should be reviewed and updated 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. The results of any risk assessments required by section 11 of the **MHSA** and any relevant occupational exposure should also be considered.
- 7.5 The **OMP**, before making a decision on fitness to work, must consider all relevant legal obligations including those prescribed in the Labour Relations Act (**LRA**), Employment Equity Act (**EEA**), Basic Conditions of Employment Act (**BCEA**) and all relevant **COPs** linked to these Acts with special reference to management of employees with medical incapacity and disability

The processes leading to a decision on fitness to work on a mine need to be based on risk management principles. Impairments may increase individual risk, but more importantly that of other employees also. Additionally, work exposures and environmental conditions may also impact on the ability of an employee to control impairment effectively, thereby increasing risk to health and safety. All these factors need to be considered prior to making a recommendation. However, to allow for reasonableness in taking fitness to work decisions, **OMPs** and employers should evaluate each case on its own merits, and should generally not allow "blanket exclusions" of employees suffering from certain conditions.

- 7.6 The methodology used for Risk Assessment is of particular concern for determining fitness to work on a mine/ entity and the **OMPs** responsible should make decisions, especially where an employee is found not to be fit to work in a specific job, by taking into consideration the specific risks of the specific job instead of "generalisation" of working groups (e.g. a truck driver with respiratory pathology working in a dust area but who has a relative low risk because of working in a relative safe area of an enclosed air conditioned environment).
- 7.7 Risk Assessment should be an integrated process between Management, Occupational Health (Including Occupational Medicine and Occupational Hygiene), Safety Professionals and Health and Safety Representatives. Where an employee's medical condition constitutes an unreasonable risk to continue his/her work, such risk must be confirmed in writing by the **OMP** after taking into consideration the specifics of his/her medical condition and his/her working environment. Medical confidentiality must be respected at all times and cases related to medical detail may only be discussed on the Health and Safety Committee after written, informed consent has been obtained from the employee. Where such an employee does not consent to disclosure of his/her medical information to the Health and Safety Committee, the **OMP** should note such objection in writing and make the final decision on fitness to work taking into account the information available to the **OMP** at the time.
- 7.8 The employee's medical condition should be interpreted in functional terms and in the context of the job requirements. Some disabilities or impairments may be irrelevant to perform a particular job without risk to health or safety and therefore such person is fit to do such work. This means that decisions on fitness to work must be based on

specific risk profiles of the individual job rather than the worst-case scenario on the mine.

8. ASPECTS TO BE ADDRESSED IN THE COP

The **COP** should address the process of health risk and health impact assessment, including ergonomic risks (see Annexure 1 attached: Health and Safety Risk Profile of the Mining Industry).

8.1 Extent and frequency of medical examination:

8.1.1 Initial/pre-placement examinations;

The **OMPs** must act on health disorders that are detected during initial or any other examination, either immediately or by appropriate referral. Fitness-to-work decisions must be reasonably practicably delayed until the state of maximum medical improvement has been reached. Employees should be informed of their obligation to comply fully to prescribed medical treatment regimens during this process and during the period of employment.

8.1.2 Periodic examination

Periodic examinations will be risk specific, taking into account the physical requirements of the occupation and workplace hazard exposure and results of risk assessment.

It is recommended that the result of this examination be either:

8.1.2.1 **The standards has been met:** a miner is fit for usual category of work.

8.1.2.2 **The standards has not been met:** a miner is unfit for usual category of work

8.1.2.3 Discretion of the **OMP**

The **COP** should address the discretion of the **OMP**:

8.1.2.3(a) At any periodic medical examination, the standards of fitness required of an employee should generally be the same as the initial standards of fitness to perform work.

8.1.2.3(b) Where there is illness or impairment present the **OMP** should always consider the effect this would have on the ability of the employee to continue work without endangering the health or safety of that employee or any other person.

8.1.2.3(c) It is impractical to cover all medical problems that employees may develop after employment and therefore the **OMP** should use professional discretion when applying the standards of fitness at periodic medical examinations.

The **COP** must consider the following:

8.1.2.3(d) The period of further exposure of the employee. Some occupational diseases take a long time to develop and further deterioration of health may continue

even after discontinuing exposure to the hazard. The further exposure of an employee to such a hazard where there is significant impairment present should be questioned. Where it is not practicable to reduce such exposure, it must be considered whether continuous exposure to these hazards (adversely affecting the employee's health) should be allowed and for what period of time. Where serious, permanent disablement could result, further exposure is undesirable thus e.g. an employee with more than 60 dB average pure tone hearing loss (0,5 kHz, 1, 2 and 3 kHz) is not fit to work in a noise zone at a mine.

- 8.1.2.3(e) The experience of the employee. Experience in a certain occupation or type of work usually enables employees to perform such work safely and without risk to their own or fellow employee's health or safety. This experience may compensate for impairment in such a way that allows the employee to continue performing work effectively without risk to health or safety.
- 8.1.2.3(f) The ability to protect the employee from further deterioration in health or impairment at work and reduce risk to fellow employees.
- 8.1.2.3(g) Supervision at work may reduce or eliminate health or safety risk due to illness or impairment. Examples are:
- Personal protective equipment may be required and its use supervised to ensure compliance where impairment has resulted from failure to use such equipment;
 - Supervised work may ensure that an employee with an illness that may cause harm to that employee (e.g. Diabetes) will be able to receive help immediately. Where such supervision is not possible the employee would not be able to perform such work without risk;
 - Similarly, a serving driver for passenger and goods conveyance is no longer fit to work as a driver if there is more than 40 dB averaged pure tone (0,5, 1, 2 and 3 kHz) (note: see paragraph 8.3.5.2.1) hearing loss, due to unacceptable risk to himself and fellow employees;
 - Supervised medication may eliminate or reduce risk to the health or safety of an employee or fellow employees: A well-controlled, responsible diabetic under close medical surveillance and supervision may be able to perform work without creating unacceptable risk; and
 - Where such supervision is not possible or where there is a documented reluctance of the employee to comply with such measures, the **OMP** should consider these in declaring an employee fit or unfit to continue to work.
- 8.1.2.3(h) The **COP** must address the comprehensive assessment of the employee, taking into account of all physical, emotional and psychological factors:
- In deciding whether an employee is fit to continue to work, consideration must be given as to how one condition may aggravate another.

- A holistic approach is required that takes cognisance of the employee's health, experience, the type of work, the risk involved etc. and how these collectively affect fitness to work.
- The employee's medical condition should be interpreted in functional terms and in the context of the job requirements. Some disabilities or impairments may be irrelevant to performing a particular job without risk to health or safety and therefore such a person is fit to do such work.

8.1.2.3(i) Alterations in exposure or medical surveillance:

- The **OMP** may consider declaring a person fit to continue working subject to certain conditions such as closer supervision and monitoring, which might include reduction in exposure or more frequent medical surveillance.
- Where the standards for fitness are not met at periodical examination, the results of the medical examination should be discussed with the employee to ensure full understanding of the risks and consequences.
- Should an employee be declared fit to work, despite certain impairments and where certain qualifications are applied to certain working standards and supervision etc., this must be discussed with the employee and the importance of these stressed to the employee.
- The **OMP** must notify the employer of the qualifications or conditions subject to which the employee may continue to perform specific work.

8.2 Exit medical examinations

The **COP** must address the exit medical examination by ensuring that all employees or persons who previously have been employed at a mine, have the right to appeal any finding of an **OMP** contained in an exit to the Medical Inspector in terms of section 20 of the **MHSA**. Regarding appeals, the Medical Inspector may, as far as possible, be assisted by the disclosure, in confidence, of personal medical information, in accordance with section 15 of the **MHSA**.

8.3 Categorisation of fitness to work

The **COP** should categorise the standards that has been met if an employee is fit for a particular job; or the standards that has not been met if an employee is unfit for a particular job:

8.3.1 Permanently unfit or temporarily unfit.

The **COP** should address the issues related to unfitness at work and consider the following:

- Should a serving employee be found unfit to perform work by the **OMP**, the reason thereof and the effective date must be recorded in the employee's medical record.
- A decision that an employee is unfit to perform that employee's usual category of work should be reached only after thorough consideration of the case and the **OMP** should fully discuss the considerations with the employee. If requested in

writing by the employee, the employee's own medical practitioner should be informed of the decision and the reasons for it.

- If an employee is declared unfit to perform work by the **OMP** as a result of an occupational disease, the employer must conduct an investigation in terms of Section 11 (5) of **MHSA**.
- The **OMP** will follow appropriate procedures in terms of the Compensation for Occupational Injuries and Diseases Act, 1993 (Act No 130 of 1993) (COIDA) or Occupational Diseases in Mines and Works Act 1973 (Act No 78 of 1973) (ODMWA) if applicable.
- The Mine Health and Safety Act contains provision (Section 20) for an employee to dispute a finding of unfitness to perform a particular category of work. In this case the employer will take reasonable steps to assist the employee.

8.3.2 Review of fitness after absence for medical reasons

Provision is made for the review of fitness after a period of absence due to medical reasons, irrespective of whether the reason is occupationally- or non-occupationally related or whether due to illness or injury. Sick note certificates used by mine medical practitioners will provide space for the treating doctor to indicate whether an employee is fit for his/her usual occupation. If declared unfit, or if the treating doctor is unsure of the employee's status of fitness, the employee may be referred to the occupational health centre for assessment.

In the case where the treating doctor is not employed by the mine, the sick note will be routed through the business unit's occupational health practitioner when the employee resumes work. The OHP will either accept the sick note as is or arrange for a review of fitness. The review of fitness will apply to all levels of employees, as well as the employees of contractors to the business unit.

8.3.3 Disability evaluation and transfer examinations (failed fitness-to-work examination).

Where the **OMP** certifies an employee as "not fit" for work, the **OMP** must make reference to why such decision was made e.g. "not able to comply with physical demands of job" as well as the reason for making this decision e.g. unable to climb stairs.

Reasonable care should be exercised in the process of evaluating potential impaired employees to not utilize the employee benefits of sick leave unnecessarily. Employees should be kept in employment as far as reasonably practicable while conducting investigations, except where further work exposures may drastically impact on an employee's wellbeing or safety, e.g. hearing impairment and pneumoconiosis. Where employees are removed from their job during these investigations, the case should be managed in line with the prescripts of the "Management of Medical Incapacity due to Ill-health and Injury" guideline.

8.4 Minimum standards of fitness to perform work at a mine

The COP should take the following into consideration:

- 8.4.1 The **OMP**, as the responsible competent person in terms of section 13 of the MHSA, must establish minimum health standards depending on findings of risk and health impact assessments at the specific mine.
- 8.4.2 This includes establishing and maintaining a risk based medical surveillance system for determining fitness to perform work of a strenuous nature.
- 8.4.3 The system should be holistic to include medical, physical and functional work capacity assessments.
- 8.4.4 The decision for fitness should be based on the outcomes of medical, physical and functional work capacity assessments. Failure to meet the standards of a single test should be dealt with in a discretionary way by the **OMP**. Some chronic conditions may need adequate supervision and control for successful accommodation to occur. The employee must give consent for disclosure of his condition, and allow for employer involvement with management and monitoring of compliance to treatment regimens.
- 8.4.5 To allow for substantive fairness in the process of fitness to work recommendations, **OMPs** should make notes and keep records of all aspects informing them on reaching recommendations. These records should be kept in the employee's medical file, and their confidentiality information maintained.

When making the decision about a person's ability to do a specific job it is imperative to take cognisance of the World Health Organisation's (WHO) stance to apply the Social Model approach rather than the Medical Model. (Refer to ILO Disability Management Code) (Annexure 1).

The **OMP** must determine minimum standards for each job category (**OREP** or man job specifications) as demonstrated in table 1 below.

Table 1: Categorisation and minimum standards for strenuous work

Very Heavy	<p>Manual Material Handling: Consists of 34-66% of the work shift (daily exposure).</p> <p>Work Environment: Manual material handling takes place in restricted work environments (ceiling heights of 0.850m - 1.5m).</p> <p>Heat Exposure: Daily exposure to high environmental heat loads for more than 34% of the work shift.</p> <p>Production / Non Production Related: Work tasks are imposed by a process (directly linked to production).</p>
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Heavy	<p>Manual Material Handling: Consists of 34-66% of the work shift (daily exposure).</p> <p>Work Environment: Manual material handling takes place in unrestricted work environments.</p> <p>Heat Exposure: Daily exposure to high environmental heat loads for more than 34% of the work shift.</p> <p>Production / Non Production Related: Work tasks are imposed by a process (directly or indirectly linked to production).</p>
Moderate	<p>Manual Material Handling: Load handling consists of less than 34% of the work shift on a daily basis or more than 34% of the work shift on an occasional basis.</p> <p>Work Environment: Unrestricted work environments or supervisory work in restricted environments.</p> <p>Heat Exposure: Occasional exposure or daily exposure in case of supervisory work.</p> <p>Production / Non Production Related: Work tasks indirectly linked to production.</p>
Light	<p>Manual Material Handling: Load handling consists of less than 34% of the work shift - occasional load handling.</p> <p>Work Environment: Unrestricted work environments and/or occasional exposure to restricted work areas.</p> <p>Heat Exposure: Occasional exposure.</p> <p>Production / Non Production Related: Work tasks indirectly linked to production.</p>
Sedentary	<p>Manual Material Handling: Load handling limited to loads of up to 10kg, occasional exposure only.</p> <p>Work Environment: Unrestricted. Work tasks take place in a seated/standing work position for at least 50% of the work shift.</p> <p>Heat Exposure: Not exposed to heat.</p>

	<p>Production / Non Production Related: Not linked to production.</p>
Roaming	<p>Manual Material Handling: None. No external workloads required other than wearing PPE.</p> <p>Work Environment: Unrestricted.</p> <p>Heat Exposure: Low exposure to heat.</p> <p>Production / Non Production Related: Not linked to production.</p> <p>i.e. no external workloads; physical demands essentially restricted to walking, climbing or crawling wearing prescribed PPE but not transporting any equipment etc.</p>

8.5 Different bodily systems

The COP should address the following:

8.5.1 Cardiovascular system

The cardiovascular system should be free from acute or chronic disease, which may impair ability to undertake the required physical exertion for a particular category of work. Persons with cardiovascular disease, particularly ischaemic heart disease or uncontrolled hypertension, are not suitable for employment as drivers of passenger or dangerous goods conveyances. A Physical Work Capacity screening (PWC) may be recommended by the OMP as an objective assessment of the cardiovascular system.

With reference to hypertension, controlled blood pressure should be below 140 mm Hg (systolic) and 90 mm Hg (diastolic).

8.5.2 Respiratory system

8.5.2.1 The respiratory system should be free from acute or chronic disease, which may impair the ability to meet the required physical performance of a particular category of work.

8.5.2.2 For screening purposes a lung function test is normal if FEV₁ is greater than 80% of predicted or the (FEV₁/FVC) ratio is equal to or greater than 70%.

8.5.2.3 In individuals where there are mild abnormalities of lung function this test should not be the sole criterion on which an individual is precluded from mine work. If the individual otherwise appears to have a normal cardio-respiratory system and is able to meet the physical performance requirements of the specified occupation then he may be found fit for a particular category of work. Refer to the MOHAC Guidance Note for occupational medical practitioners on lung function testing.

8.5.2.4 Any respiratory impairment, whether occupational or non-occupational in origin, equal to or greater than that which may be required for a certification of second degree occupational lung disease, would disqualify an employee for work in an environment considered a respiratory risk.

8.5.2.5 Active, infectious pulmonary tuberculosis

The **OMP** will refer an employee suffering from active tuberculosis for appropriate treatment. The employee is not fit to work in a condition where there is continuous infectivity or serious permanent impairment. Employees, where either one or both lungs have been seriously affected by previous tuberculosis, should not be exposed to dust environments

8.5.3 Endocrine and metabolic system

8.5.3.1 Diabetes mellitus

Diabetics may be employed in such occupations as the **OMP** may consider safe having regard to their condition. Insulin dependent diabetics should not work underground except under exceptional circumstances where the **OMP** is satisfied that all required health or safety concerns have been met. Well-controlled, mild non-insulin dependent diabetics may be certified fit to work in a particular category of work underground. Well-controlled, mild non-insulin dependent diabetics may be certified fit to work by the **OMP** as drivers for non-passenger or ordinary goods conveyance.

8.5.3.2 Obesity

A degree of obesity adversely affecting heat tolerance or the ability to exercise, mobility, general health or possible medical evacuation may render a person unfit for a particular category of work. Obesity may also be associated with sleep apnoea.

8.5.4 Diseases of the blood and blood forming organs

Any significant disease of the hematopoietic system may preclude employment in certain categories of work.

8.5.5 Mental and behavioural disorders

8.5.5.1 Acute or Chronic Psychosis

A person suffering from a psychosis may not be fit for a particular category of work.

8.5.5.2 Alcohol or substance abuse / dependency

To be guided by the Alcohol and Substance Abuse Policy, as directed by the Health and Safety Committee at the mine.

8.5.6 Reproductive system

Women should be protected against health risks during pregnancy, after birth and while breast feeding.

The Department of Labour (DoL) has provided a Code of Practice in terms of Section 87 (1) (b) of the Basic Conditions of Employment Act (75 of 1997). Occupational Medicine Practitioners should refer to this code to guide them on the management of this category of employees (Ref: No 19453 Government Gazette, 13 November 1998; No R.1441 13 November 1998).

8.5.7 Diseases of the nervous system and sensory organs

8.5.7.1 Epilepsy and other conditions of altered or impaired consciousness

8.5.7.1.1 Any medical condition which may result in an altered or impaired level of consciousness, including epilepsy, renders a person unsuitable for employment in certain areas or occupations on a mine, such as underground, or operation of moving machinery or in dangerous situations such as working at heights, near water, high voltage electricity or any other potentially dangerous situations.

8.5.7.1.2 Notwithstanding the above, an epileptic under medical treatment and without any events within a preceding period of two years may be considered fit for certain categories of work underground or on surface.

8.5.7.1.3 No persons with a history of epilepsy may ever be certified fit as a driver for passenger or dangerous goods conveyance.

8.5.7.2 Ear, nose and throat

An ear, nose and throat examination is required (which includes intact tympanic membranes and functioning Eustachian tubes) and the minimum standards set out below must be met for occupations involving changes in barometric pressure and /or exposure to noise.

8.5.7.2.1 Audiometric Standards

Pure tone audiometric screening at 0,5 kHz, 1 kHz, 2 kHz and 3 kHz must meet the following criteria:

8.5.7.2.1(a) Age 16-39: pure tone average of 15 dB or less

8.5.7.2.1(b) Age 40 AND ABOVE: Pure tone average of 25 dB or less

8.5.7.2.1(c) IRRESPECTIVE OF AGE: a threshold of 45 dB or less at 3 kHz.

8.5.7.2.2 Hearing Aids

The use of a hearing aid by those working in a designated noise zone should not be permitted.

8.5.7.2.3 Vision and eye disorders

Binocular vision is necessary for all categories of underground employees.

Visual acuity, corrected, should be:

8.5.7.2.3(a)	Underground:	6/9 binocular	6/12 weaker eye
8.5.7.2.3(b)	Surface	6/18 binocular	6/24 weaker eye
8.5.7.2.3(c)	Passengers or goods conveyance	6/9 binocular 6/9 worst	

Colour vision and normal visual fields are required for passenger, dangerous and non-dangerous goods conveyances and certain other occupations, such as electricians. A normal visual field refers to at least 50 degrees nasal and 70 degrees temporal vision.

8.5.7.2.4 Skin

A history of or presence of skin conditions liable to be aggravated by working conditions may preclude employment in a particular category of work.

8.5.8 Musculo skeletal system

SPINE

There should be sufficient musculo-skeletal integrity to undertake the required physical exertion for a particular category of work. Physical Work Capacity (PWC) or Functional Work Capacity (FWC) may be recommended by the **OMP** to assess fitness to perform work of a strenuous nature.

It will be important for **OMPs** to differentiate between degenerative processes which are normal for a specific age and "pathological" degeneration before a decision is made on fitness to work and in most cases a specialist orthopaedic surgeon or specialist neurosurgeon opinion should be considered. Occupational therapy, physiotherapy and biokineticist functionality evaluation reports may assist the **OMP** with Fitness To Work (FTW) recommendations.

8.5.9 Diseases of the digestive system

There should not be any significant disease of the digestive system, which may impair ability to perform a particular category of work.

The **OMP** will take special care to ensure that persons suffering from Gastro-Intestinal Infectious Diseases should not be involved in the handling of food.

8.5.10 Diseases of the genito-urinary system

There should no unexplained proteinuria, glycosuria, haematuria or other urinary abnormalities, which may render a person unfit for a particular category of work.

8.5.11 Heat tolerance

For employees working in conditions where the wet bulb temperature is equal to or exceeds 27,5 degrees Celsius, or the dry the bulb temperature is equal to or exceeds 37.0 degrees Celsius, the **COP** drawn up in accordance with the Guideline for the Mandatory **COP** on Thermal Stress Management of the **DMR** should be applied. Employees, who need to work in such environments, must meet all the physical requirements and pass the necessary screening tests prescribed in that guideline and **COP** before being declared fit to work.

8.6 Medical surveillance and records

This issue is dealt with comprehensively in the Guideline for the Compilation of a Mandatory **COP** on the Roles and Responsibilities of Occupational Health Practitioners in a System of Medical Surveillance on a Mine (**DMR** 16/3/3/3-A7). The following comments are made in order to link the relevant **COPs**:

- 8.6.1 Occupational medical surveillance will be done at each of the occupational health centers. Staff conducting medical examinations will be competent in terms of requirements of the **MHSA**.
- 8.6.2 Records will be kept in a medically confidential manner at occupational health centers and computerized network records will have appropriate access controls. These may be made available only in accordance with the ethics of medical practice, or if required by law or court order, or if the employee has in writing consented to the release of the information (section 15 of **MHSA**).
- 8.6.3 Employees are entitled to copies of, or copies of parts of, medical surveillance records or records of occupational hygiene measurements that relate to themselves (section 19 of the **MHSA**).
- 8.6.4 All reasonable steps will be taken to ensure that records of medical surveillance will be stored safely and not be destroyed or disposed of for 40 years from the last date of medical surveillance of an employee, as prescribed by the **MHSA** (sections 15(2) and 13(8)).
- 8.6.5 Medical surveillance procedures will be transparent and open to discussion with all role-players. Endeavors will be made to conduct these professionally, scientifically and based on best reasonable current medical practice.

8.7 Medically affected employee policy and procedures

The **COP** must address a formalized policy and procedure in place, which will effect fair assessment and encourage optimal placement of employees found unfit for their usual category of work.

Out of cycle assessments:

Employees may refer themselves or may be referred for assessment as to fitness to continue in their current occupation at **any time**, e.g.:

- An employee who has problems in coping with the physical demands of his occupation.
- An employee may suspect a work-related illness, such as boot dermatitis.

Line Management or the Human Resources Department may refer an employee who is unable to cope at work.

8.8 Appeals

Should the employee or his/her representative dispute the decision that the employee is unfit to perform work, the employee may lodge an appeal in terms of Section 20 of the **MHSA** with the Medical Inspector

8.9 Conclusion

It is clearly impossible to encompass within the guideline specific advice on every medical condition. However, as a general rule the **OMP** conducting the examination should be satisfied in each case that no medical condition or impairment is present which could either be significantly aggravated by working in a mine/ entity or represent an unacceptable health or safety risk to the individual employee, or any other person at the mine. Conditions not specified in the guideline, which impact on health or safety should also be assessed in the light of this general principle. For assessment of fitness to work on a mine/ entity according to this guideline an employee is an employee as defined by both **MHSA**.

There may be different evidence-based guidelines which can be used for assessment of medical impairment and the ability to do specific work, for example the official disability guidelines used by American Academy for Disability Evaluating Physicians. The Guides to the Evaluation of Permanent Medical Impairment - 6th Edition (American Medical Association) describes the levels of impairment of bodily systems to indicate to **OMPs** when such impairments could be classified as Minimal, Mild, Moderate and Severe; this supports the **OMPs** to create a more informed opinion on the work stressors that employees with medical conditions can cope with.

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 programs and schedules for this **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 purpose 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.
- 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 responsibility.

ANNEXURE 1: Minimum Standards Table – for compliance (from original document)

PARAMETER	NO HAZARD	MINES / WORKS SURFACE	MINES UNDERGROUND	SURFACE OR UNDERGROUND	
	1	2	3	4	5
Fitness category	1	2	3	4	5
Frequency of examination	3 yearly	Annual	Annual	Annual	Annual
Minimum age	16	18	18	21	21
Visual acuity loss (corrected)	-	6/18 binocular 6/24 worst	6/9 binocular 6/12 worst monocular vision - refer OMP	6/9 binocular 6/9 worst monocular vision - refer OMP	
Colour blindness (consider testing)	-		-	Consider exclusion	Consider exclusion
Hearing (Average binaural hearing loss in 0,5, 1,2,3 kHz frequencies)		Initial: Age 16–39 <15dB, 40+ <25dB, also <45dB at 3kHz → Temp unfit. Previous employer to refer for Diagnostic Audiogram. If compensated previously, provide proof			
		> 60dBA – unsuitable		> 40dBA - unsuitable	
Spirometry		FVC <80% of expected FEV1/FVC <70% of expected Refer to OMP			
		If certified with 1° degree or 2° degree silicosis – not fit to work in silica exposed environment > 10% of OEL – refer OMP			
Epilepsy	-	Unsuitable (until 2yrs fit free)		Permanent Exclusion	
Diabetes		Well controlled Diabetes – OK Well controlled NIDDM – OK IDDM – OK, depending on hazards exposure Adequate sugar control for the work environment	Well controlled NIDDM – OK IDDM - Unsuitable, except in special circumstances (Refer OMP)	Well controlled NIDDM - OK IDDM - Unsuitable	NIDDM / IDDM - Unsuitable

Alcohol / drug abuse screening	Refer OMP	Refer OMP	Refer OMP	Unsuitable if positive (must test)
Heat tolerance screening (if exposed to heat) Referral for HTS (see Guideline for the Mandatory COP for an Occupational Health Programme on Thermal Stress COP)		Any history of repeated heat cramps - Refer to OMP Any history of heat exhaustion/heat stroke – Refer to OMP Failed HTS x3 – Refer to OMP Refer for HTS if indicated in Thermal Stress COP or if risk factors below is present (1 AND 2 plus 3 OR 4): 1. Age >50ys; 2. BMI >30; 3. Employee has any chronic medical condition; 4. Any history of heat related illness since last visit		
Weight (refer BMI nomogram) BMI 20-26 Normal	BMI <15 or >35 - Counsel	BMI < 19 or >35 or weight <50kg or >130 kg – Refer to RFA, then OMP		
Physical Labor Physical / Functional work capacity	-	Referral during annual medical surveillance or out-of-cycle examination only if risk factors at the discretion of the OHP/OMP		

Category 4

NON-PASSENGER AND ORDINARY GOODS CONVEYANCE AND WORK INVOLVING HEAVY OR POTENTIALLY DANGEROUS MACHINERY

e.g. Drivers or operators of non-passenger locomotives, dump trucks, delivery vehicles, loaders, cranes, forklifts, tractors, pumps, riggers, shaft timbermen, ventilation fan attendants, fridge plant staff, electricians, instrument technicians and other occupations thought to fall within this category.

Category 5

PASSENGER AND DANGEROUS GOODS CONVEYANCE

e.g. Winding Engine Drivers, Drivers of Busses, taxis, locomotives, onsetters, banksmen and other occupations thought to fall within this category.

DEPARTMENT OF MINERAL RESOURCES

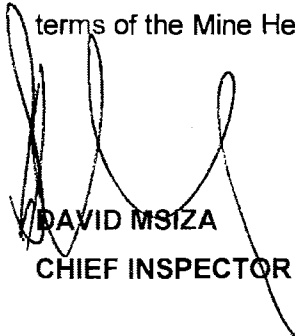
NO. R. 148

05 FEBRUARY 2016

MINE HEALTH AND SAFETY ACT, 1996 (ACT NO 29 OF 1996)

**GUIDELINE FOR A MANDATORY CODE OF PRACTICE ON
THE RIGHT TO REFUSE DANGEROUS WORK AND
LEAVE DANGEROUS WORKING PLACES**

I **DAVID MSIZA**, Chief Inspector of Mines, under section 49(6) of the Mine Health and Safety Act, 1996 (Act No. 29 of 1996) and after consultation with the Council, hereby issues the guideline for a mandatory code of practice on the right to refuse dangerous work and leave dangerous working places in terms of the Mine Health and Safety Act, as set out in the Schedule.



DAVID MSIZA
CHIEF INSPECTOR OF MINES

SCHEDULE

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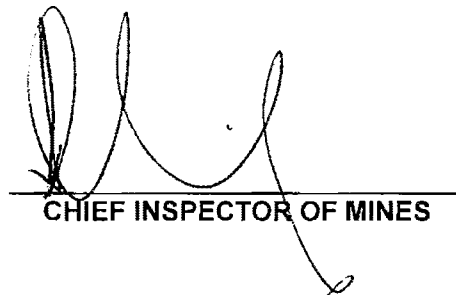
DEPARTMENT OF MINERAL RESOURCES

MINE HEALTH AND SAFETY INSPECTORATE

GUIDELINE FOR THE COMPILATION OF A

MANDATORY CODE OF PRACTICE ON

**THE RIGHT TO REFUSE DANGEROUS WORK AND
LEAVE A DANGEROUS WORKING PLACE**



CHIEF INSPECTOR OF MINES



mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

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PART A: THE GUIDELINE

1. FOREWORD

- 1.1 At the **MHSC OHS** Summit held in November 2011, the stakeholders adopted an action plan aimed at improving various aspects of health and safety at mines. As part of implementing the 2011 Summit Action Plan, the **MHSC** subsequently instructed **MRAC** to develop a draft guideline on the **RRDW** for the South African mining sector. This guideline has its origins in that request.
- 1.2 Under common law employers are required to provide and maintain a work environment that is safe and without risk to the health or safety of employees. This is reflected in section 2 of the **MHSA** which requires the employer to ensure, as far as reasonably practicable, that the mine is commissioned, operated, maintained and decommissioned in such a way that employees can perform their work without endangering the health and safety of themselves or of any other person.
- 1.3 Arising from this entitlement to a safe working environment, employees have the **RRDW** under common law. (There are certain exceptions, e.g. policemen, firemen, security guards, etc. who are specifically employed to do certain dangerous work.) This right entails not only that the employee is entitled to leave a working place where he / she has reason to believe that the working place is unsafe (the **RLDWP**), but also that an employee is entitled to refuse to do work in a working place that is safe, but in which there is any equipment, machine, device or thing the employee is required to use or operate which is likely to endanger himself/herself or any other employee (the **RRDW**). Put differently, the **RRDW** can be exercised either by refusing to do the required work but remaining in the working place, or by refusing to do the required work and leaving the working place.
- 1.4 Section 23(1)(a) of the **MHSA** partly reflects the common law mention above. It gives employees the **RLDWP** if circumstances arise which, with **reasonable justification**, appear to that employee to pose a serious danger to the health or safety of that employee or if the health and safety representative responsible for that working place directs that employee to leave that working place. The fact that section 23 does not mention the **RRDW** does not mean employees do not have that right. This guideline will cover both these rights.
- 1.5 This Guideline was informed by two studies conducted by the Centre for Sustainability in Mining and Industry (CSMI) of the University of the Witwatersrand, i.e. International Legislative Review "The Right to Refuse Dangerous Work" (August 2013) and a Sector Wide "Quantitative and Qualitative Study on The Right to Refuse Dangerous Work" (September 2013).
- 1.6 Section 23(2) of the **MHSA** requires the employer, after consulting the health and safety committee at the mine, to determine effective procedures for the general

exercise of the rights granted by section 23(1). The purpose of this guideline is to assist the employer in drawing up its **COP** so that it contains such effective procedures for the general exercise of the **RRDW** and the **RLDWP** and that the employer complies with section 23(2).

2. LEGAL STATUS OF GUIDELINES AND CODES OF PRACTICE

In accordance with section 9(2) of the **MHSA** an employer must prepare and implement a **COP** on any matter affecting the health or 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 the relevant guideline issued by the Chief Inspector of Mines (section 9(3)). Failure by the employer to prepare or implement a **COP** in compliance with this Guideline is a breach of the **MHSA**.

3. OBJECTIVE OF THE GUIDELINE

- 3.1 The objective of this guideline is to assist the employer, in consultation with the health and safety committee at the mine, with the drafting of a **COP** including a procedure to be followed by the employees, health and safety representatives, and employers in the exercise of the **RRDW** and **RLDWP**.
- 3.2 It provides guidance of a general nature on the required format and contents for the **COP** and details sufficient information to enable the employer at the mine to prepare a comprehensive and practical procedure for the exercise of the **RRDW** and **RLDWP**.

4. DEFINITIONS AND ACRONYMS

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

"**COP**" means Code of Practice;

"**DMR**" means Department of Mineral Resources;

"**EMPLOYEE**" means any person who is employed or working at a mine;

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

"**MHSC**" means the Mine Health and Safety Council;

"**MRAC**" means the Mining Regulation Advisory Committee;

“OHS” means occupational health and safety;

“RLDWP” means the right to leave a dangerous working place;

“RRDW” means the right of refusal to do dangerous work;

“Reasonable justification” means that the employee has some objective information that makes him or her believe there are unsafe conditions at the working place or the work to be done is unsafe to the extent that there is an imminent and serious danger to the health or safety of person at that working place. The employee does not have to be correct in his or her knowledge or belief, but such belief should be reasonable given the information of the employee. These principles apply to both the **RRDW** and **RLDWP**

5. SCOPE

This mandatory guideline covers the legislative background to and procedures for exercising of the **RRDW** and **RLDWP**

6. TASK GROUP MEMBERSHIPS

The members of the Task Group involved in the preparation of this guideline were:

State

- (a) Anthony Coutinho
- (b) Maelula Ramabulana
- (c) Shimanyana Kgosiemang
- (d) Kevin Hewitson

Employers

- (a) Anton van Achterbergh
- (b) Duncan Scott

Labour

- (a) Paul Mardon
- (b) Martha Llale

Consultant

- (a) Noel Williams

PART B: AUTHOR'S GUIDE

- 1.1 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-reference. Wording must be unambiguous and concise.
- 1.2 It should be indicated in the **COP** and on each annexure to the **COP** whether:
 - 1.2.1 The annexure forms part of the **COP** and must be incorporated in the **COP** or whether aspects thereof must be incorporated in the **COP**; or
 - 1.2.2 The annexure is merely attached as information for consideration in the preparation of the **COP**.
- 1.3 When annexures are used the numbering should be preceded by the letter allocated to that particular annexure and the numbering should start at one (1) again. (e.g. 1, 2, 3, A1, A2, A3, ...).
- 1.4 Whenever possible illustrations, tables, graphs and the like should be used to avoid long descriptions and/or explanations.
- 1.5 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 sidenotes as well as in a separate bibliography.

PART C: FORMAT AND CONTENT OF THE MANDATORY CODE OF PRACTICE

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 the Right to Refuse Dangerous Work and Leave a Dangerous Working Place";
- 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-A6** issued by the Chief Inspector of Mines;
- 1.4 The mine reference number for the **COP**;
- 1.5 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 mandatory **COP** was drawn up in accordance with Guideline **DMR** Reference Number: **DMR 16/3/2/1-A6** issued by the Chief Inspector of Mines;
- 3.2 This is a mandatory **COP** in terms of sections 9(2) and 9(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 or 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 should 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 paragraph. 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 and their particular risks associated with these methods;
- 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; and
- 5.5 Other relevant **COPs**.

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

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. Other related **COPs** must address how the significant risks identified in the risk assessment process must be dealt with, having regard to the requirements of section 11(2) and 11(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, provide personal protective equipment and to institute a programme to monitor the risk. Where despite these controls a significant imminent risk arises employees may need to exercise the **RRDW** or the **RLDWP**

8. ASPECTS TO BE ADDRESSED IN THE COP

While the main purpose of the **COP** should be to set out an effective mine specific procedure for employees to exercise their **RRDW** and **RLDWP**, it is important for that procedure to be put in context, so that employees and management understand and are in agreement how it fits into the overall risk management process at the mine. It is therefore recommended that the **COP** should include the aspects set out below.

8.1 Legislative background

The **COP** should first set out the legislative background relating to the **RRDW** and **RLDWP**. Annexure 1 sets out the common law and most of the relevant **MHSA** provisions. Those provisions of Annexure 1 which are relevant to the circumstances at the mine should be included in the **COP** in a logical sequence and in simple language which the persons at the mine would clearly understand. Annexure 1 is attached for information purposes and should be consulted in the preparation of the **COP**.

8.2 Summary of major health and safety hazards

The **COP** should set out a table of the major health and safety hazards identified in terms of the mine's risk assessment which may give rise to employees having to exercise the **RRDW** or **RLDWP**. This table should also identify the major dangers associated with each such identified hazard. The table should be reviewed and updated on a regular basis and therefore it may be preferred to attach it as an annexure to the **COP**. Annexure 2 is an example of how this could be done. This is by no means an exhaustive list, but a list of some commonplace hazards. The hazards in Annexure 2 may not be relevant to the mine and are given for illustrative purposes only. Annexure 2 is attached for information purposes in the preparation of the **COP**.

8.3 Procedure for employees to exercise their RRDW and RLDWP

- 8.3.1 The **COP** should set out an effective mine specific procedure for employees to exercise their **RRDW** and **RLDWP** having regard to the minimum requirements of what must be included in the procedure as contained in section 23(2)(a) - (e) of the **MHSA**.
- 8.3.2 The aim of the procedure should be to ensure that the circumstances giving rise to any employee exercising the **RRDW** or **RLDWP** are addressed, and any disputes about them, are resolved as expeditiously as possible at the lowest possible level of the organizational structure, but with the matter being capable of being elevated, if it remains unresolved, to appropriate more senior levels until it is resolved at the highest level at the mine or by the employer.
- 8.3.3 In the case of small or smaller mines, the levels of organizational structures will differ and in some instances there may only be one. In such cases more than one appeal level would be inappropriate. Procedures appropriate to the organizational levels at the mine should be determined, having regard to the aforesaid principal that disputes should be resolved as expeditiously as possible, but be capable of being elevated to the highest level of management.
- 8.3.4 The different steps of the procedure should also contain strict time limits within which those steps should be taken.
- 8.3.5 The persons potentially involved in each step of the procedure should be clearly identified (with names and occupations, where appropriate) and the functions and powers of each person clearly set out.
- 8.3.6 Where appropriate, the procedure could describe how certain steps should be performed (e.g. what employees must do when they exercise the **RRDW** or **RLDWP**; how a workplace should be barricaded off; etc.).

Annexure 3 sets out an example of a procedure for employees to exercise their **RRDW** and **RLDWP**. This annexure is for information purposes and should be consulted in drafting the **COP**

8.4 Training

The **COP** should identify all the persons who could be involved in any of the steps of the procedure to exercise the **RRDW** or **RLDWP**, from the employees, health and safety representatives, supervisors, etc. to the highest level of management, and set out:

- 8.4.1 The different training requirements for each of these persons or groups of persons;
- 8.4.2 What the training should cover, which could include the following:
- 8.4.2.1 The major health and safety hazards, their identification and controls thereof;

- 8.4.2.2 The **RRDW** and **RLDWP**;
- 8.4.2.3 When the **RRDW** and **RLDWP** can be exercised and by whom;
- 8.4.2.4 The procedure for exercising the **RRDW** and **RLDWP**;
- 8.4.2.5 The interface between the **RRDW** and **RLDWP** and other risk management processes at the mine;
- 8.4.2.6 How employees can raise a complaint in the event of any obstruction to them exercising or wanting to exercise the **RRDW** or **RLDWP**; and
- 8.4.2.7 Previous occurrences where employees have exercised the **RRDW** or **RLDWP** and lessons learnt.
- 8.4.3 How often the training should be given / refreshed;
- 8.4.4 Who will be doing the training; and
- 8.4.5 Measures to ensure, measure and monitor the effectiveness of the training.

8.5 Communication

The **COP** should set out a communication strategy that highlights management's support for employees to exercise the **RRDW** and **RLDWP** under appropriate circumstances and that reinforces awareness amongst employees of this aspect of risk management. The communication strategy should identify the different target audiences, the appropriate language to be used for each and could cover the following:

- 8.5.1 Regular communication bulletins and newsletters;
- 8.5.2 Regular awareness activities, which could include the following:
 - 8.5.2.1 Print media: posters and pamphlets;
 - 8.5.2.2 Electronic, audio--visual and new media: DVD clips at the shaft bank, sms messages, email and digital media;
 - 8.5.2.3 Promotional media: T-shirts, caps, helmet stickers and cards; and
 - 8.5.2.4 Face to face: tool box talks and drama.

8.5.3 Visible felt leadership, involving management:

8.5.3.1 Complying with health and safety rules;

8.5.3.2 Regular discussions with all levels of employees;

8.5.3.3 Support for employees who have exercised the **RRDW** or **RLDWP**; and

8.5.3.4 Support for health and safety representatives who have requested employees to exercise the **RRDW** or **RLDWP**

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 this **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 purpose 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.
- 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 of the **COP** on delivery of a written request to the employer. 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 responsibility.

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REPUBLIK INDONESIA
KEMENTERIAN KEHUTANAN

REPUBLIC OF AUSTRALIA
DEPARTMENT OF AGRICULTURE



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PART 2 OF 2

ANNEXURE 1:

The legislative background relating to the **RRDW** and **RLDWP**

1. The common law

- 1.1 Employers are required to provide and maintain a work environment that is safe and without risk to the health or safety of employees.
- 1.2 Arising from this entitlement to a safe working environment, employees have the **RRDW** under common law. (There are certain exceptions, e.g. policemen, firemen, security guards, etc. who are specifically employed to do certain dangerous work.) This right entails not only that the employee is entitled to leave a working place where he has reason to believe that the working place is unsafe (the **RLDWP**), but also that an employee is entitled to refuse to do work in a working place that is safe, but in which there is any equipment, machine, device or thing the employee is required to use or operate which is likely to endanger himself/herself or any other employee (the **RRDW**). Put differently, the **RRDW** can be exercised either by refusing to do the required work but remaining in the working place, or by refusing to do the required work and leaving the working place.

2. The MHSA**2.1 Section 2:**

- (1) The *employer* of every *mine* that is being worked must:
 - (a) Ensure, as far as *reasonably practicable*, that the *mine* is designed, constructed and equipped:
 - (i) To provide conditions for safe operation and a *healthy* working environment; and
 - (ii) With a communication system and with electrical, mechanical and other equipment as necessary to achieve those conditions.
 - (b) Ensure, as far as *reasonably practicable*, that the *mine* is commissioned, operated, maintained and decommissioned in such a way that *employees* can perform their work without endangering the *health* and *safety* of themselves or of any other person.

2.2 Section 6:

- (1) Every *employer* must:

- (a) Supply all necessary *health and safety equipment* and *health and safety facilities* to each *employee*; and
 - (b) Maintain, as far as *reasonably practicable*, that equipment and those facilities in a serviceable and hygienic condition.
- (2) Every *employer* must ensure that sufficient quantities of all necessary personal protective equipment are available so that every *employee* who is required to use that equipment is able to do so.
- (3) Every *employer* must take reasonable steps to ensure that all *employees* who are required to use personal protective equipment are instructed in the proper use, the limitations and the appropriate maintenance of that equipment.

2.3 Section 10:

- (1) As far as *reasonably practicable*, every *employer* must:
- (a) Provide *employees* with any information, instruction, training or supervision that is necessary to enable them to perform their work safely and without *risk to health*; and
 - (b) Ensure that every *employee* becomes familiar with work-related *hazards* and *risks* and the measures that must be taken to eliminate, control and minimise those *hazards* and *risks*.
- (2) As far as *reasonably practicable*, every *employer* must ensure that every *employee* is properly trained:
- (a) To deal with every *risk* to the *employee's health* or *safety* that:
 - (i) Is associated with any work that the *employee* has to perform; and
 - (ii) Has been recorded in terms of section 11.
 - (b) In the measures necessary to eliminate, control and minimise those *risks* to *health* or *safety*;
 - (c) In the procedures to be followed to perform that *employee's* work; and
 - (d) In relevant emergency procedures.

2.4 Section 11:

- (1) Every *employer* must:
- (a) Identify the *hazards* to *health* or *safety* to which *employees* may be exposed while they are at work;

- (b) Assess the *risks* to *health* or *safety* to which *employees* may be exposed while they are at work;
 - (c) Record the significant *hazards* identified and *risks* assessed; and
 - (d) Make those *records* available for inspection by *employees*.
- (2) Every *employer*, after consulting the *health and safety committee* at the *mine*, must determine all measures, including changing the organisation of work and the design of safe systems of work, necessary to:
 - (a) Eliminate any recorded *risk*;
 - (b) Control the *risk* at source;
 - (c) Minimise the *risk*; and
 - (d) In so far as the *risk* remains:
 - (i) Provide for personal protective equipment; and
 - (ii) Institute a programme to monitor the *risk* to which *employees* may be exposed
- (3) Every *employer* must, as far as *reasonably practicable*, implement the measures determined necessary in terms of subsection (2) in the order in which the measures are listed in the paragraphs of that subsection.
- (4) Every *employer* must:
 - (a) Periodically review the *hazards* identified and *risks* assessed, including the results of *occupational hygiene* measurements and *medical surveillance*, to determine whether further elimination, control and minimisation of *risk* is possible; and
 - (b) Consult with the *health and safety committee* on the review.

2.5 Section 22:

Every *employee* at a *mine*, while at that *mine*, must:

- (a) Take reasonable care to protect their own *health* and *safety*;
- (b) Take reasonable care to protect the *health* and *safety* of other persons who may be affected by any act or omission of that *employee*;

- (c)
- (d) Report promptly to their immediate supervisor any situation which the *employee* believes presents a *risk* to the *health* or *safety* of that *employee* or any other person, and with which the *employee* cannot properly deal;
- (e) Co-operate with any person to permit compliance with the duties and responsibilities placed on that person in terms of *this Act*, and
- (f)

2.6 Section 23:

- (1) The *employee* has the right to leave any *working place* whenever:
 - (a) Circumstances arise at that *working place* which, with reasonable justification, appear to that *employee* to pose a serious danger to the *health* or *safety* of that *employee*; or
 - (b) The *health and safety representative* responsible for that *working place* directs that *employee* to leave that *working place*.
- (2) Every *employer*, after consulting the *health and safety committee* at the *mine*, must determine effective procedures for the general exercise of the rights granted by subsection (1), and those procedures must provide for:
 - (a) Notification of supervisors and *health and safety representatives* of dangers which have been perceived and responded to in terms of subsection (1);
 - (b) Participation by representatives of employer and representatives of the *employees* in endeavouring to resolve any issue that may arise from the exercise of the right referred to in subsection (1);
 - (c) Participation, where necessary, by an *inspector* or technical adviser to assist in resolving any issue that may arise from the exercise of the right referred to in subsection (1);
 - (d) Where appropriate, the assignment to suitable alternative work of any *employee* who left, or refuses to work in, a *working place* contemplated in subsection (1); and

- (e) Notification to any *employee* who has to perform work or is requested to perform work in a *working place* contemplated in subsection (1) of the fact that another *employee* has refused to work there and of the reason for that refusal.
- (3) If there is no *health and safety committee* at a *mine*, the consultation required in subsection (2) must be held with:
 - (a) The *health and safety representatives*; or
 - (b) If there is no *health and safety representative* at the *mine*, with the *employees*.
- (4) The *Minister*, by notice in the *Gazette*, must determine minimum requirements for the procedures contemplated in subsection (2).

2.7 Section 30:

- (1) A *health and safety representative* may:
 - (a) Represent *employees* on all aspects of *health and safety*;
 - (b) Direct any *employee* to leave any *working place* whenever circumstances arise at that *working place* which, with reasonable justification, appears to the *health and safety representative* to pose a serious danger to the *health* or *safety* of that *employee*;
 - (c) Assist any *employee* who has left a *working place* in terms of section 23;
 - (d) Identify potential *hazards* and *risks* to *health* or *safety*;
 - (e) Make representations or recommendations to the *employer* or to a *health and safety committee* on any matter affecting the *health* or *safety* of *employees*;
 - (f) Inspect any relevant document which must be kept in terms of *this Act*;
 - (g) Request relevant information and reports from an *inspector*;
 - (h) With the approval of the *employer*, be assisted by or consult an adviser or technical expert who may be either another *employee* or any other person;
 - (i) Attend any meeting of a *health and safety committee*:
 - (i) Of which that representative is a member; or
 - (ii) Which will consider a representation or recommendation made by that representative.

-
- (j) Request:
 - (i) An *inspector* to conduct an investigation in terms of section 60; or
 - (ii) The *Chief Inspector of Mines* to conduct an inquiry in terms of section 65.

 - (k) Participate in consultations on *health* and *safety* with:
 - (i) The *employer* or person acting on behalf of the *manager*, or
 - (ii) An *inspector*.

 - (l) Participate in any *health* and *safety* inspection by:
 - (i) The *employer* or person acting on behalf of an *employer*, or
 - (ii) An *inspector*.

 - (m) Inspect *working places* with regard to the *health* and *safety* of *employees* at intervals agreed with the *employer*;

 - (n) Participate in any internal *health* or *safety* audit;

 - (o) Investigate complaints by any *employee* relating to *health* and *safety* at work;

 - (p) Examine the causes of accidents and other dangerous occurrences in collaboration with the *employer* or person acting on behalf of the *manager*;

 - (q) Visit the site of an accident or dangerous occurrence at any reasonable time;

 - (r) Attend a post-accident inspection;

 - (s) Co-operate with the *employer* in the conducting of investigations in terms of section 11 (5);

 - (t) Participate in an inquiry held in terms of section 65; and

 - (u) Perform the functions:
 - (i) Agreed by the *health and safety committee*; or
 - (ii) *Prescribed*.
- (2) The rights and powers referred to in subsection (1) apply to *health and safety representatives* referred to in section 25 (1) only in respect of the *working places* for which they are responsible.

2.8 Section 31:

- (1)
- (2)
- (3) The *employer* must provide *health and safety representatives* with:
 - (a) The facilities and assistance reasonably necessary to perform their functions;
 - (b) Training that is reasonably required to enable them to perform their functions; and
 - (c) Time off from work, without loss of remuneration, to attend any training course that is agreed or *prescribed*.

2.9 Section 32:

Every *employer* must notify the *health and safety representatives* concerned and, if there is a *health and safety committee*, the *employee* co-chairperson of that *committee*:

- (a) In good time, of inspections, investigations or inquiries of which an *inspector* has notified the *employer*, and
- (b) As soon as practicable, of any accident, *serious illness* or *health-threatening occurrence*, or other dangerous event.

2.10 Section 83:

- (1) No person may discriminate against any *employee* for:
 - (a) Exercising a right in terms of *this Act* or in terms of a collective agreement contemplated in *this Act*;
 - (b) Doing anything that the *employee* is entitled to do in terms of *this Act* or in terms of a collective agreement contemplated in *this Act*;
 - (c) Refusing to do anything that the *employee* is entitled to refuse to do in terms of *this Act* or in terms of a collective agreement contemplated in *this Act*;
 - (d) Refusing to do anything that the *employee* is prohibited from doing in terms of *this Act* or in terms of a collective agreement contemplated in *this Act*; and

- (e) Standing for election, or performing any function, as a *health and safety representative* or a member of a *health and safety committee*.

2.11 Section 91:

- (1) Any person, including an *employer*, who contravenes, or fails to comply with, any:
- (a) Provision of *this Act*;
 - (b) *Regulation*; or
 - (c), commits an offence and is liable to a fine or imprisonment as may be *prescribed*.

3. Comment

- 3.1 The requirement under the common law and the **MHSA** for the employer to provide employees with safe and healthy working environment demands of employers to prepare and implement comprehensive hazard identification and risk management system. This is specifically reflected in section 11 of the **MHSA**.
- 3.2 The control measures implemented by the employer to address the significant identified hazards and risks should under normal circumstances be appropriate to protect employees from those identified significant hazards and risks.
- 3.3 It is only if the control measures fail, or if new unexpected significant hazards and risks arise for which the control measures are inadequate, and there is no other effective way of protecting the health or safety of endangered employees, that the **RRDW** or the **RLDWP** may be exercised.
- 3.4 Section 23(1)(a) of the **MHSA** gives an employee the right to leave a *working place* if circumstances arise at that *working place* which, with **reasonable justification**, appear to that *employee* to pose a serious danger to the *health* or *safety* of that *employee*. "**Reasonable justification**" is not defined in the **MHSA**, but means that the employee has some objective information that makes him or her believe there are unsafe conditions at the working place or the work to be done is unsafe to the extent that there is an imminent and serious danger to the health or safety of person at that working place. The employee does not have to be correct in his or her knowledge or belief, but such belief should be reasonable given the information of the employee. These principles apply to both the **RRDW** and **RLDWP**.

ANNEXURE 2:

Example of a Table of the Major Health and Safety Hazards Identified in terms of a Mine's Risk Assessment which may give rise to Employees having to Exercise the RRDW or RLDWP.

(The hazards and associated dangers in the Table below are by no means an exhaustive list, but a list of some commonplace hazards and associated dangers. The hazards and dangers in Annexure 2 may not be relevant to the mine, and are given for illustrative purposes only. Annexure 2 is attached for information purposes in the preparation of the COP.)

Hazard	Dangers associated with the hazard
Hanging wall / roof / sidewall / rib side.	<ul style="list-style-type: none"> • Working places that have not first been examined and made safe as required by regulation 14.1 (FOG regulations). • Working places where safety pillars have been removed or do not adhere to the minimum safety pillar dimensions. • Missing or blasted out support. • Rock bursts.
Winches and rigging.	<ul style="list-style-type: none"> • Winch not anchored or incorrectly anchored. • Missing guard. • Open electrical connections. • Snatch blocks not anchored correctly. • No signalling arrangements. • No illumination.
Ventilation and temperatures.	<ul style="list-style-type: none"> • Dust levels in the atmosphere exceed the specified maximum. • Airflow has been restricted. • Temperatures exceed the maximum allowable or have increased considerably. • Breakdown of main fan.
Gas accumulations and fumes.	<ul style="list-style-type: none"> • The presence of flammable and/or noxious gasses which exceed the maximum permissible limits.
Water accumulations, flow of water.	<ul style="list-style-type: none"> • Any abnormal water flows from strata or drilled holes. • Any major water flows from ore passes and box holes. • Any accumulation of water of unknown depth.

Flow of broken rock, mud or slimes.	<ul style="list-style-type: none"> • Uncontrolled flow of rock, mud from ore passes or box holes. • Any imminent or initiated flow of mud from the top or side of mine tailings facilities.
Misfires, explosives.	<ul style="list-style-type: none"> • Any misfired hole with which the crew cannot deal. • Any accumulation of explosives, especially old explosives.
Fires and explosions.	<ul style="list-style-type: none"> • Any fire or explosion in other parts of the mine which could affect the working place. • Any working place which constitutes a "hazardous location" (as defined in MHSA regulations chapter 10 dealing with hazardous locations) and in which apparatus is used that is not "explosion protected apparatus", as defined in the regulations.
Defective equipment and vehicles.	<ul style="list-style-type: none"> • Equipment and vehicles which prove to have defects during pre-service examination. • Equipment and vehicles which become defective or inoperative during the shift.
Power failure.	<ul style="list-style-type: none"> • Power failure, local or general, which may affect the operation of fans and other critical equipment.
Dangerous electrical equipment and installations.	<ul style="list-style-type: none"> • Open connections, frayed cables, etc.
Lack of illumination.	<ul style="list-style-type: none"> • No or ineffective illumination at equipment and machinery, where moving parts can endanger safety.
Inadequate personal protective equipment (PPE).	<ul style="list-style-type: none"> • Non-availability of PPE. • Damaged or worn PPE not replaced. • Inappropriate selection/below standard PPE.
Inadequate training	<ul style="list-style-type: none"> • Inadequate training to perform a task safely (including basic, induction, refresher training). • Inadequate training on the major hazards (including basic, induction, refresher training).
Unacceptable and dangerous behaviour of colleagues.	<ul style="list-style-type: none"> • Including substance abuse at work. • Aggressive or violent behaviour. • Inadequate training, experience or licencing for the job.

Noise	<ul style="list-style-type: none">• Noise levels not to exceed the specified maximum.• Engineering interventions to be introduced to restrict levels at source.• Noise levels that cannot be limited to have correct identified PPE provided.
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ANNEXURE 3:

Example of a procedure for employees to exercise their **RRDW** and **RLDWP**

1. Notification by employee

1.1 Any employee who, with **reasonable justification**, exercises the **RRDW** or **RLDWP** must immediately:

1.1.1 Notify that employee's immediate supervisor and the health and safety representative for the working place, if they are present at or near the workplace, of his/her actions and the reasons for it; and

1.1.2 Notify other employees if there may be a serious danger to their health or safety.

1.2 If the immediate supervisor is not present, the employee must notify, as soon as possible and at least before the end of that shift, the supervisor of that immediate supervisor, or another easily contactable mine official of at least equivalent rank.

1.3 If the health and safety representative for that workplace is not present, the employee must notify another workplace health and safety representative or a full time health and safety representative.

2. Notification by workplace health and safety representative

2.1 If a workplace health and safety representative directs employees to stop work and/or leave a working place, that representative must:

2.1.1 Immediately notify the supervisor of that working place or, if he / she is not present, notify another supervisor or management official of at least equivalent rank;

2.1.2 Notify any full time health and safety representative.

3. Notification to health and safety department or manager

3.1 The **COP** should set out a procedure to ensure that a notification of any incident reaches the health and safety department at the mine as soon as practicable, or where there is no health and safety department, the mine manager.

4. Evaluation of danger and steps to be taken

4.1 The supervisor or any other mine official present (contemplated in 1.1.1 1.2 or 2.1.1) and the health and safety representative (contemplated in 1.1.1 or 1.3) must meet as soon as practicable to evaluate whether there is any danger to the health or safety of employees which is serious and, if so, to determine what steps, if any, should be taken to safely remove the danger to health or safety. If any such steps are determined:

4.1.1 The supervisor must ensure that the necessary steps are taken to make the work and/or working place healthy and safe;

- 4.1.2 The supervisor must take reasonable precautions to prevent unauthorised entry to any unsafe working place; and
- 4.1.3 Once these steps have been taken, the supervisor and the workplace health and safety representative must jointly advise the employees accordingly, where after the employee/s must return to the workplace immediately and/or start work immediately.
- 4.2 If, however, it is agreed that no serious danger to the health or safety of the employee/s prevails, the employee/s will be required to return to the workplace immediately and/or start work immediately.
- 4.3 If the persons contemplated in 4.1 are unable to agree on whether or not there is a serious danger and/or on the steps that need to be taken to remove any serious danger:
 - 4.3.1 The supervisor must notify a manager with responsibility for the section of the mine concerned; and
 - 4.3.2 The representative must notify the full time health and safety representative, and may request the assistance of a technical adviser (see 4.17 below).
- 4.4 Thereafter, a meeting must be held involving the persons referred to in 4.3.1 and 4.3.2, to seek to resolve the issue that led to the refusal to work and/or employees leaving the working place.
- 4.5 If agreement is still not reached on whether there is a serious danger and/or the steps that must be taken to remove any serious danger, management must arrange for the involvement of an appropriate technical adviser to assist the parties. Should agreement still not be reached following the involvement of such technical adviser the employer must make a final decision on all issues on which there is disagreement after consultation with such technical adviser. Such decision must be in writing and must record the reasons for the decisions, highlighting the reasons where any employer decisions deviate from any recommendations by the technical adviser.
- 4.6 When agreement is reached on the steps that must be taken to remove the danger, or the employer has taken a final decision as contemplated in 4.4, the supervisor and the health and safety representative must:
 - 4.6.1 Ensure that the necessary steps are taken to make the work and/or working place health and safe;
 - 4.6.2 Jointly advise the employees of the steps that are being taken; and
 - 4.6.3 Once the steps have been taken, jointly advise the employees accordingly, where after the employees must return to the workplace immediately and/or start work immediately.

5. Re-assignment and protection

5.1 Employees who have refused to work or have withdrawn from a working place:

5.1.1 Must remain in the nearest safe place to that working place, unless directed otherwise by mine management; and

5.1.2 May not be disciplined for exercising their right to refuse dangerous work and/or leave a dangerous working place unless they acted in bad faith or refuse immediately to return to work once the work and/or working place is safe.

5.2 The management of the mine may require an employee who has refused to work and/or withdrawn, or who was instructed to stop work and/or withdraw from a working place, to perform suitable alternative work if the employee is competent and qualified to perform the work concerned.

5.3 Management may request another employee to do the work or to work in the working place, but if any employee is requested to do the work and/or work in the working place before the matter has been resolved, management must notify the employee:

5.3.1 That another employee has refused to do the work and/or work there;

5.3.2 Of the reason(s) for the refusal;

5.3.3 Of the reason(s) why the employee is requested to do the work and/or work in that working place, given the other employee's refusal; and

5.3.4 That the employee has the same right to refuse as the first employee.

6. Participation by technical advisers

6.1 If a workplace health and safety representative requests that a technical adviser participates in the resolution of the issue:

6.1.1 Management must not unreasonably withhold the approval required;

6.1.2 Management must give reasonable assistance necessary to enable participation by the technical adviser; and

6.1.3 Access by any technical adviser will be in terms of existing recognition and procedural agreements between the parties and existing mine policies and procedures.

7. Report

7.1 The supervisor and the workplace health and safety representative must each prepare a report, or may prepare a joint report, setting out:

7.1.1 The circumstances which arose that posed a serious danger to the health or safety of an employee; and

7.1.2 The steps taken to resolve that problem.

7.2 The report/s must be placed before the next meeting of the mine's health and safety committee, which committee should monitor all instances of withdrawals.

DEPARTMENT OF MINERAL RESOURCES

NO. R. 149

05 FEBRUARY 2016

MINE HEALTH AND SAFETY ACT, 1996 (ACT NO 29 OF 1996)**GUIDELINE FOR A MANDATORY CODE OF PRACTICE FOR THE
MANAGEMENT OF MEDICAL INCAPACITY DUE TO ILL-HEALTH AND
INJURY**

I **DAVID MSIZA**, Chief Inspector of Mines, under section 49 (6) of the Mine Health and Safety Act, 1996 (Act No. 29 of 1996) and after consultation with the Council, hereby issues the Guideline for the Management of Medical Incapacity due to Ill-health and Injury in terms of the Mine Health and Safety Act, as set out in the Schedule.


DAVID MSIZA**CHIEF INSPECTOR OF MINES****SCHEDULE**

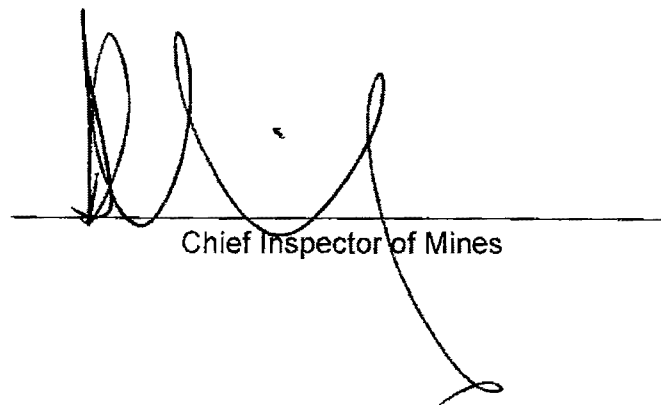
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DEPARTMENT OF MINERAL RESOURCES

MINE HEALTH AND SAFETY INSPECTORATE

GUIDELINE FOR THE COMPILATION OF A
MANDATORY CODE OF PRACTICE FOR

THE MANAGEMENT OF MEDICAL INCAPACITY DUE TO ILL-HEALTH AND INJURY



Chief Inspector of Mines



mineral resources
Department
Mineral Resources
REPUBLIC OF SOUTH AFRICA

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PART A: THE GUIDELINE

1. INTRODUCTION

- 1.1 This guideline has been drafted to assist **Occupational Medical Practitioners (OMP's)**, Safety Health & Environment consultants (SHE) and Human Resource Consultants in managing employees with **medical incapacity** in mining.
- 1.2 This guideline does not deal with individual medical conditions, but rather aims to formalise the basic principles of management of employees with **medical incapacity** in order to ensure that a fair and consistent approach is followed.
- 1.3 An employee's medical condition requires a program for effective management of such an employee. This should be interpreted in functional terms and in the context of the specific job requirements and/or specific job requirements of adjusted or alternative jobs considered during the management of such an employee. The outcome of the process followed must pose no additional risk to the health or safety of such an employee or of co-workers, where relevant.
- 1.4 In instances of **reasonable accommodation** or alternative job placements, the employer is always entitled to expect full productivity of the accommodated employee.
- 1.5 The interpretation of this guideline should be applicable for the unique operational circumstances of all mining operations, e.g. small mines, open cast mines, underground operations, beneficiation plants, condensation plants or smelters.
- 1.6 The guideline applies to applicants or incumbents in a position.

2. LEGAL STATUS OF GUIDELINE AND COP'S

In accordance with Section 9(2) of the **Mine Health and Safety Act**, Act 29 of 1996 (as amended) an employer must prepare and implement a **Code of Practice (COP)** on any matter affecting the health or safety of employees and other persons who may be directly affected by activities at mines and when the Chief Inspector of Mines requires it. The **COPs** must comply with any relevant guidelines issued by the Chief Inspector of mines (Section 9(3)). Failure by the employer to prepare or implement a **COP** in compliance with this guideline is a breach of the **MHSA**.

3. OBJECTIVE OF THIS GUIDELINE

- 3.1 The objective of this guideline is to ensure procedural and substantive fairness with employment decisions in respect of applicants or existing employees with **medical incapacity** and those qualifying as persons with **disabilities** under **EEA**.
- 3.2 Collateral objective is to assist the **OMP** and Human Resource Consultants charged with the task of preparing a **COP** which, if implemented and complied with, would:
- a) Ensure that employees suffering from **medical incapacity**, where possible, would be returned to their normal, adjusted or alternative work by making early return to work recommendations.
 - b) Ensure that employees suffering from **medical incapacity**, where such employees cannot be accommodated in their normal, adjusted or alternative work, would be managed in a consistent and fair manner.
 - c) Ensure that employees suffering from **medical incapacity** are fit to continue performing productively and safely in the normal, adjusted, or alternative work at the mine.
 - d) Ensure that the affected employee will be able to perform work without an unacceptable health or safety risk to that employee or any other person.

4. DEFINITIONS AND ACRONYMS

COP means a code of practice.

COIDA means Compensation for Occupational Injuries and Disease Act, 1993 (Act no 130 of 1993), as amended.

DISABILITY means an alteration of an individual's capacity to meet personal, social, or occupational demands or statutory or regulatory requirements because of **impairment**.

NOTE:

Disabilities could include but are not limited to:

- *Serial behavioral disorders that are against public policy;*
- *Self-imposed body adornments such as tattoos and body piercing;*
- *Compulsive gambling, tendency to steal or light fires;*
- *Disorders that affect a person's mental or physical state if they are caused by current use of illegal drugs or alcohol, unless the affected person has participated or is participating in a recognized program of treatment;*
- *Normal deviations in weight, height and strength; and conventional physical and mental characteristics and common personality traits.*

*Employees are considered as persons with **disabilities** if they satisfy all or any of the physical, sensory, intellectual or mental **impairment** conditions.*

EMPLOYMENT EQUITY ACT (EEA) means the Employment Equity Act, Act 55 of 1998, as amended.

EMPLOYEE REPRESENTATIVE means the following:

- The employee's recognised full-time union representative;
- **Health and Safety Representative** for the area; or
- A colleague or co-worker of the employee's choice.

ESSENTIAL FUNCTIONS OF THE JOB means those functions of the job which must be done in order to achieve the goals and objectives of that specific job.

FUNCTIONAL CAPACITY ASSESSMENT means the objective test designed to replicate work tasks and assess an injured and/or an ill employee's ability to perform those tasks.

HEALTH AND SAFETY REPRESENTATIVE means a person elected, appointed and trained in terms of the **Mine Health and Safety Act** (Section 29)

IMPAIRMENT means the following: loss of use, or derangement of any body part, organ system, or organ function. **Impairment** may be of a physical, or mental and/or a combination of both, or a sensory nature.

NOTE:

- **Physical impairment** means a temporary or permanent, partial or total loss of bodily function or part of the body. It includes, but not limited to, loss of limbs, trauma, etc.
- **Mental and/or Intellectual impairment** means a clinically recognized condition or illness that affects a person's thought processes, judgment or emotions.
- **Sensory impairment** means a clinically recognised condition or illness that affects a person's sensory organs. It includes, but not limited to, sensory impairments such as being deaf, hearing impaired, or visually impaired.

ILO means International Labour Organisation.

INCAPACITY: means the temporary or permanent **impairment** on the grounds of ill health or injury.

INHERENT JOB REQUIREMENTS means those requirements the employer stipulates as necessary, for a person to be appointed to the job, and are necessary in order to enable an employee to perform the essential functions of the job.

LABOUR RELATIONS ACT (LRA) means the Labour Relations Act, Act 66 of 1995, as amended.

MEDICAL INCAPACITY means the inability to find and retain employment due to a disease and/or an injury that prevents the performance of the customary duties of an employee.

MEDICAL INCAPACITY AND/OR DISABILITY MANAGEMENT means the process of managing people with medical **incapacity** and/or **disability** including but not limited to recruitment, retention, and advancement.

MEDICAL INCAPACITY MANAGEMENT COMMITTEE means a formal body at each business unit and/or operation site responsible for co-ordinating and synchronizing operational issues regarding rehabilitation, re-skilling and re-training, evaluation for replacement and **reasonable accommodation** of people with medical **incapacity** and/or **disabilities**.

MEDICAL SURVEILLANCE means a planned program of periodic examinations which may include clinical examinations, biological monitoring, and/or other medical tests of employees by an **occupational health practitioner** or, in prescribed cases, by an **occupational medical practitioner**.

MHSA means the Mine Health and Safety Act, Act 29 of 1996, as amended

MINIMUM HEALTH STANDARDS (MHS) means the health status required of an employee, or new recruit, taking into account the health and safety hazards to which such a person will be exposed to, as well as the **inherent job requirements**, to execute the essential functions of a job in a way that will not pose any danger to the health and safety of such a person, or any co-workers or has the potential to cause damage to property of the employer.

OCCUPATIONAL HEALTH AND SAFETY RISKS means exposure to source of harm and the potential impact thereof on the health and/or safety of the person, or of co-workers.

OCCUPATIONAL HEALTH NURSING PRACTITIONER (OHNP) means an occupational health nurse or a person who holds a qualification in occupational health as recognised by the South African Nursing Council.

OCCUPATIONAL HYGIENIST means a competent person appointed in terms of Section 12 (1) of the **MHSA**

OCCUPATIONAL MEDICAL PRACTITIONER (OMP) means a medical practitioner, who holds a qualification in occupational medicine or an equivalent qualification, recognised by the Health Professions Council of South Africa (HPCSA).

PROGRESSIVE CONDITIONS means those conditions that are likely to develop or change or recur with increased limitation of the person's ability to function effectively.

REASONABLE ACCOMMODATION means the involvement of any change in the working environment or in the way things are customarily done in order to enable a person with a disability to enjoy equal employment opportunities and access to work and employee benefits.

NOTE:

Reasonable accommodation may include, but is not limited to, the following:

- *Modified job schedules*
- *Reassignment of vacant positions*
- *Provision of special equipment or devices*
- *Modification of administrative procedures*
- *Provision of assistant or support staff*
- *Modification of training materials or procedures.*

REHABILITATION means a structured program developed to ensure optimal recovery and deployment of employees who suffer **impairment or disability**.

RETURN-TO-WORK RECOMMENDATIONS means the recommendations made by the **OMP**, in conjunction with safety specialists, **occupational hygienists**, line managers and/or Human Resources (where appropriate), giving guidance to the **Medical Incapacity Management Committee** for returning an employee to his or her normal work, adjusted work or alternative work.

SAFETY OFFICER means person on a mine who is responsible for the safety of the people who work or visit the mine.

SUBSTANTIALLY LIMITING means a condition is substantially limiting if, in its nature, duration or effects, it **substantially limits** the person's ability to perform the essential functions of the job for which they are being considered or employed.

WORK CAPACITY EVALUATION means a comprehensive evaluation and description of what the employee can and cannot do, a thorough understanding of the duties, working conditions, work processes, job tasks, job requirements and stressors and facilities of the workplace.

5. SCOPE

This guideline covers a basic system for the **OMP** and Human Resources Consultants to use when managing employees suffering from **medical incapacity**.

- 5.1 This guideline does not advise management of individual medical conditions, but rather prescribes the general principles to be followed for employees suffering from **medical incapacity**. This is done in order to ensure that such employees will be managed in a consistent and fair way. All relevant legislation should be considered in this process. This guideline should therefore be viewed as an important tool to support employers to align the principles of **MHSA** with other relevant pieces of legislation e.g. **LRA**, **EEA**, **COIDA** and **COPs** e.g. South African Disability Code, **ILO Code**.
- 5.2 The **OMP** involved in this management process should be satisfied that the outcome of each individual case should not contribute negatively to the health and safety of the affected employee, or to the health and safety of any other person or co-worker.

6. MEMBERS OF THE INITIAL TASK GROUP

6.1 Principal members responsible

- Dr Chris de Beer (Occupational Medicine Practitioner and Certified Professional in Medical Incapacity and Disability Management)
- Dr Andre du R Louw (Occupational Medicine Practitioner)

6.2 Additional members

- Dr Johan Schoeman (Occupational Hygienist)
- Dr Nico Claassen (Specialist Physiologist and Extra-ordinary lecturer)
- Mr. Jaco Snyman (Project Manager)

6.3 Independent members

- Dr Jaco Blignaut (Occupational Medicine Practitioner)
- Dr Martje Joubert (Occupational Medicine Practitioner)
- Me Zuritha du Preez (Senior Human Resource Consultant – Matla Collieries)
- Mr. Lukas Coetsee (Attorney of Law)
- Mr. Francois Smith (Professional Safety Expert)
- Mr. Paul Venter (Experienced Underground Mine Captain)

6.4 Members of the Tripartite Task Team

- Dr D Mokoboto (State)
- Dr K Baloyi (Employer)
- Mr. A Letshele (Labour)

PART B: AUTHOR'S GUIDE

1. The **COP** must, where possible, follow the sequence laid out in **Part C "Format and Content of the mandatory COP"**. The pages as well as the chapters and sections must be numbered to facilitate cross-reference. Wording must be unambiguous and concise.
2. In this guideline for a **COP**, unless the context otherwise indicates, the meaning of the words will have the meaning as described within this document and that of the general understanding of such words.
3. It should be indicated in the **COP** and on each annex to the **COP** whether:
 - a) The annex forms part of the guideline and must be complied with or incorporated in the **COP** or whether aspects thereof must be complied with or incorporated in the **COP**, or
 - b) The annex is merely attached as information for consideration in the preparation of the **COP** (i.e. compliance is discretionary).
4. 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...).
5. Whenever possible illustrations, tables, graphs and the like should be used to avoid long descriptions and/or explanations.
6. 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 CODE OF PRACTICE

1. TITLE PAGE

The title page must include the following:

- 1.1 Name of mine;
- 1.2 the heading: **Mandatory COP for incapacity due to ill health and injury;**
- 1.3 a statement to the effect that the **COP** was drawn up in accordance with this guideline **DMR16/3/2/3 – A6** issued by the Chief Inspector of Mines;
- 1.4 the mine's reference number for the **COP**;
- 1.5 effective date of the **COP**; and
- 1.6 revision dates.

2. TABLE OF CONTENTS

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

3. STATUS OF THE MANDATORY CODE OF PRACTICE

Under this heading the **COP** must contain statements to the effect that:

- 3.1 The mandatory **COP** was drawn up in accordance with the Guideline DMR 16/3/2/3–A6 issued by the Chief Inspector of Mines.
- 3.2 This is a mandatory **COP** in terms of section 8 (2) of the MHSa.
- 3.3 The **COP** supersedes all previous relevant **COP**'s.
- 3.4 All managerial instructions or recommended procedures and standards on the relevant topics must comply with the **COP** and must be reviewed to assure 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. The committee should include competent persons sufficient in number to effectively draft the **COP**.

5. GENERAL INFORMATION

The general information relating to the mine must be stated in this paragraph. The following minimum information must be provided:

- 5.1 A brief description of the mine and its location;
- 5.2 the commodities produced; and
- 5.3 other relevant **COP**'s.

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 **Medical incapacity** in an employee may impact on risk management decisions on a number of levels. The **OMP** responsible for managing employees with medical incapacity should ensure that at least the following risks are considered:

- 7.1.1 The workplace environment and/or the conditions that might pose a threat on the medical conditions of the affected employee.
- 7.1.2 The health and safety of other people and co-workers due to the impact of the work environment on an employee with medical incapacity.
- 7.1.3 The impact on productivity due to the effect of any underlying condition.

7.2 Multi-disciplinary inputs are thus necessary in the process of medical incapacity management, and normal risk management principles should be adhered to at all times. Below (figure 1) is a simplified example of these risk management principles and

processes. This process should be applied to all levels of risk impact due to the incapacity.

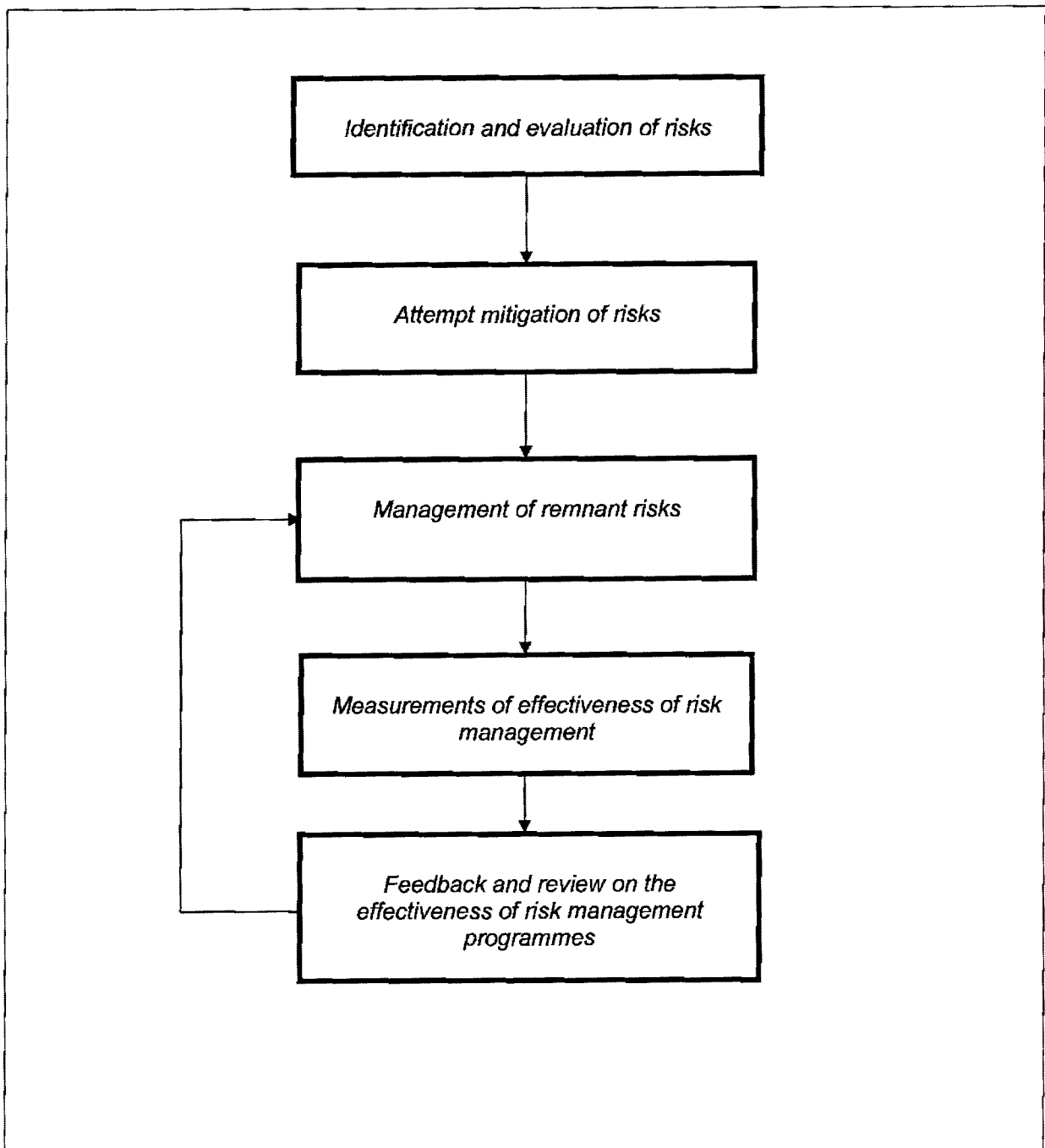


Figure 1: Generic example of a risk management approach.

8. ASPECTS TO BE ADDRESSED IN THE CODE OF PRACTICE ON MANAGEMENT OF EMPLOYEES WITH MEDICAL INCAPACITY WORKING AT A MINE

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 above will be addressed.

The **COP** must cover at least the aspects set out below unless there is no significant risk associated with that aspect at the mine.

8.1 Medical Incapacity Management Process

8.1.1 Objectives

The **COP** must address the following:

- 8.1.1.1 The early identification of employees in need of incapacity management.
- 8.1.1.2 A medical- and/or health risk assessment in order to determine:
 - a) The potential for returning such employee to his own, adjusted or alternative job (**work capacity evaluation**).
 - b) The potential health and safety risks to continue with his own, adjusted- or alternative work
 - c) The potential to make structured early return to work recommendations, which may include ongoing physical or psychological treatment and vocational **rehabilitation**.
 - d) Making early return to work recommendations to, amongst others, prevent such employee to develop a disability mind set.
 - e) To establish if and when an employee with a medical **incapacity** will qualify as a person with a **disability** so that the employer can introduce the necessary interventions as required under EEA.

8.1.2 Early identification of employees

The **COP** must identify employees with medical **incapacity** as follows:

- a) Regular analysis of sick leave absenteeism by Human Resources to identify employees with high frequency absenteeism or those with long periods of absenteeism, usually longer than 21 days;
- b) Employees with abnormal findings at pre-placement and/or annual **medical surveillance** done by the occupational health service;

- c) Sick certificates from treating medical specialists indicating an employee with **medical incapacity**;
- d) Line manager reporting poor work performance and/or work attendance of employees; and
- e) Employee self-reporting:
 - Wherever there is reason to be concerned about any employee identified by one of these means, such instance should be investigated to determine possible **medical incapacity**;
 - The Human Resource Consultant arranges a formal meeting with such employee in order to identify the cause of absenteeism and/or poor performance and take appropriate actions. The employee is classified in one of the following categories to facilitate further management:
 - Employee with medical condition;
 - Employee with social problem;
 - Employee with **incapacity** other than medical (e.g. training, skills, etc.);
 - Other Human resource factors (e.g. sick leave abuse); and
 - Employees suffering from medical conditions are reported to an **occupational medical practitioner** to facilitate the **incapacity management process**.

8.1.3 The COP must do medical assessment

The medical assessment done by the **occupational medical practitioner** should be focused on obtaining a complete medical and work history, as well as all other relevant occupational health information to determine the employee's fitness to work.

- The **OMP** should refer the employee with recommendations to the **medical incapacity management committee**.

8.1.4 The COP must perform work capacity evaluation.

8.1.4.1 **Work capacity evaluation** is the evaluation of the ability to execute the essential functions of the job, determining of the endurance to sustain the capacity over the whole work shift and to do such a job without risk to the health and safety of the employee, co-workers or other persons. It therefore depends on an evaluation of the employee's physical and mental condition, the workplace conditions and demands of the specific employee, taking into account the **minimum health standards** for the specific job in question.

In assessing the work capacity of an affected employee the **occupational medicine practitioner** should:

- Determine the **essential functions** and person-job specifications.
- Refer to the **minimum health standards**.
(Refer to the appropriate **minimum health standards** of the relevant job to identify the specific physical and mental standards required.)
- Determine the functional capacity.

NOTE:

*When doing the **functional capacity assessment** it should be remembered that the **Social Model** (ability of a person to do a job) is internationally (ILO and World Health Organisation) preferred to the **Medical Model** (medical diagnosis only). It is therefore imperative for the **occupational medical practitioner** that each case be evaluated individually and not to make assumptions based on general perceptions or beliefs.*

- Determine the physical capacity:

This evaluation considers every bodily system and/or organ and evaluates the status quo of the function of the specific system and or organ. Comparing the findings with the predicted values of "normal" individuals (Refer AMA Guideline 6th edition for normal values and impairment ratings) an accurate measurement can be done of the impairment of function of the specific system and/or organ.

- Determine the mental capacity

Mental capacity screening consists primarily of cognitive and mood screening by applying appropriate screening tests, e.g. DASS, MMSE, etc.

- Occupational therapy evaluation and determining rehabilitation prospects

Medical impairment ratings depend on maximal medical improvement of specific medical conditions. The possibility of further medical treatment available and the expected response to such treatment has to be taken into account to evaluate an employee's ability to improve on the existing functional- and work capacity assessment results.

8.1.5 The COP must address return to work recommendations

8.1.5.1 Where it is possible to return an employee to his own, adjusted or alternative work, but the employee requires further and/or ongoing medical treatment and/or physical, mental, or vocational rehabilitation, the **occupational medical practitioner** should include such recommendations when referring the employee to the **Medical Incapacity Management Committee**.

8.1.5.2 As the early return to work placement of such employees usually involves a multidisciplinary team of experts (e.g. safety specialist, **occupational hygienist**, occupational therapist, treating specialists, clinical psychologist, etc.), the **occupational medicine practitioner** should liaise with the appropriate specialists before making such recommendations.

8.1.5.3 An early return to work recommendation should contain the following information:

- a) Expected duration of treatment, rehabilitation and training required;
- b) Expected work capacity against predicted progress;
- c) The recommended periods for doing re-assessments to determine progress employee against expected parameters,
- d) Special **reasonable accommodation** measures to be implemented such as not working on heights or other relevant to the specific case and;
- e) The proposed early return to work recommendations is then discussed at the appropriate **medical incapacity management committee**.

8.1.6 The COP must address reasonable accommodation.

8.1.6.1 **Reasonable accommodation** requirements apply to applicants and employees with disabilities who are suitably qualified for the job and may be required:

- during the recruitment and selection process;
- in the working environment;
- in the way work is usually done, evaluated and rewarded; and
- in the benefits and privileges of employment.

8.1.6.2 The obligation to **reasonable accommodation** may arise when an applicant or employee voluntarily discloses a disability related accommodation need (which may be verified by employer) or when such a need is reasonably self-evident to the employer.

- 8.1.6.3 Employers must also try to accommodate employees, as far as reasonably practicable, when work, or the work environment, changes or when **impairment** varies which affects the employee's ability to perform the essential functions of the job.
- 8.1.6.4 The employer should consult the employee and, where reasonable and practicable, technical experts to establish appropriate mechanisms to accommodate the employee e.g. organisation with or for people with disabilities.
- 8.1.6.5 **Reasonable accommodation** includes, but is not limited to:
1. adapting existing facilities to make them accessible;
 2. re-organising workstations;
 3. changing training and assessment materials and systems;
 4. restructuring the job so that non-essential functions are re-assigned;
 5. adjusting work time and leave; and
 6. providing specialised supervision, training and support in the workplace.

NOTE:

*The employer is not obliged to accommodate an employee with a disability if this would impose an unjustifiable hardship on the business of the employer or where such a definite safety risk exists. Nor is the employer obliged to create new jobs in order to accommodate employees with medical **incapacity** and/or **disability**.*

8.2 Management of employees with **medical incapacity**

It is imperative that the management of employees with **medical incapacity** will always be done in a substantive and procedurally fair manner. Due to the complexities of the different pieces of legislation in this regard management should establish adequate governance structures to ensure full compliance. The governance structure required to ensure effective and efficient management of **medical incapacity** should allow for the unique operational circumstances of each mining entity, e.g. small and large operations. It is, however, imperative that the functions listed below are represented at each operation.

8.2.1 **Medical Incapacity Management Committee**

This is a formal body at each mine or operation or site where **medical incapacity** and/or **impairment** and possibilities of treatment, rehabilitation, adaptation of the

tasks or work environment, **reasonable accommodation** in alternative posts, or permanent medical **disability** are discussed, evaluated and managed.

The directives for the decision-making in this committee must be protection of employee rights of fair labour practices, safety and health of employees and other persons, and protection of employer's rights to productivity and not to suffer unjustifiable hardship.

It is important for the specific operation or site to establish beforehand what would constitute a quorum for decision making purposes in their own context.

Suggested and/or co-opted members of **Medical Incapacity Management Committee**:

1. The chairperson (a Senior Human Resources Official).
2. The medical incapacity coordinator.
3. The human resources consultant of the medical case
4. The **occupational medical practitioner (OMP)** and/or the **occupation health nursing practitioner (OHNP)**.
5. Safety Professional.
6. **Occupational Hygienists**, if appropriate.
7. A secretary (to keep minutes).
8. The employee concerned.
9. The **employee representative**.
10. The direct supervisor and/or line manager of the area where the employee is employed,
11. Any other employee, specialist, social worker or consultant co-opted permanently or temporarily by the chairperson to assist the **medical incapacity panel** in fulfilling its functions.

NOTE:

The different functions could have the same representatives at small operations.

8.2.2 Functions of **Medical Incapacity Management Committee**

The functions of the **Medical Incapacity Management Committee** are to:

- 8.2.2.1 Consider the **OMP's** findings and recommendations to determine suitable alternative placement.
- 8.2.2.2 Consider findings of workplace inspection report for purpose of possible **reasonable accommodation**.

- 8.2.2.3 Consider the recommended early return to work recommendations (if applicable) to determine suitable alternative placement.
- 8.2.2.4 Ensure compliance to all relevant legal obligations.
- 8.2.3 Where such employee still suffers from medical incapacity after the pre-determined period for treatment and/or rehabilitation, the **OMP** should evaluate this employee to verify if such employee will qualify as a Person with Disability (**EEA**) and if so, then **reasonable accommodation** measures should be considered by the mine. The employee has to satisfy all three of the following criteria in order to qualify as a Person with Disability:
- (a) **Medical impairment** must be present (Usually measured against AMA guidelines).
 - (b) The **impairment** should be, or expected to be, long lasting (more than 12 months) or recurring (like epilepsy).
 - (c) The condition must cause substantial limitation in the employee's ability to do the essential functions of his job.
 - (d) The **Medical Incapacity Management Committee** is responsible, after considering the recommendations of the **OMP**, to determine one of the following:
 - Permanent adjusted duty (continuation of normal services with job modification)
 - Temporary adjusted duty
 - Permanent transfer to another type of work (even at a lower grade)
 - Termination of service, where an employee cannot be accommodated.
- 8.2.4 The Committee should ensure fairness of process in all respects of their functions.
- 8.2.5 The Committee should allow for the employee involved, or his/her representative, to present his/her specific case and to make further representations to the panel for consideration; to bottom of 9.3.2.
- 8.2.6 The Committee Members should discuss the findings and recommendations of the committee, and the recommendations of the employee and/or his/her representative, and should convey their findings to the employee in writing.
- 8.2.7 The Committee should inform the employee on the appeal procedures, if applicable.
- 8.2.8 The Committee should assess and review its effectiveness on an ongoing basis to ensure continuous improvement.

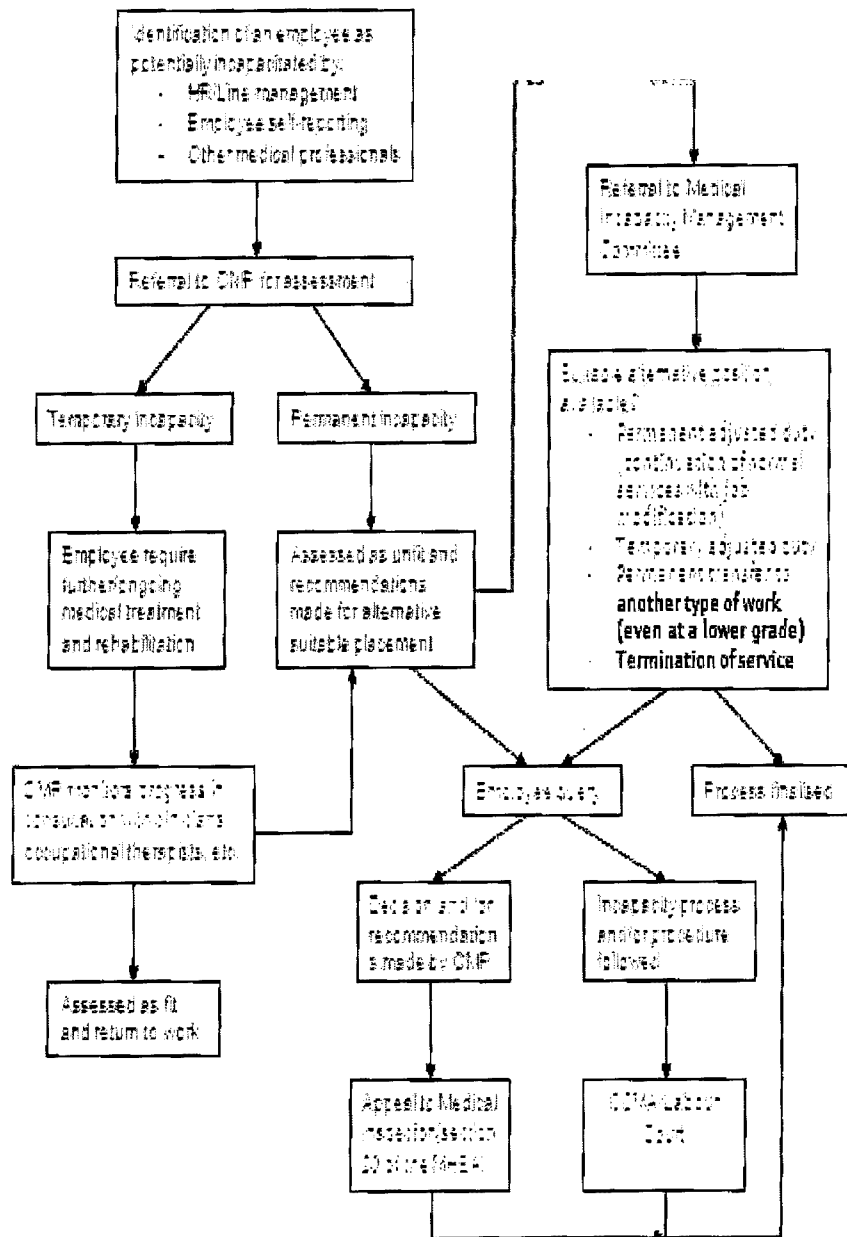
8.3. Disputes concerning the process and/or decisions of the **Medical Incapacity Management Committee**:

8.3.1 The **COP** should ensure that the objective of this committee is to have consensus that the process followed was consistent with this guideline and that fair labour practice was followed in each case with **medical incapacity** and/or **disability**. However, sometimes differences in opinion may exist between members of this committee on the management of a specific case and such differences should be resolved in a practical, professional and timely manner to try and avoid delays in decision making.

8.3.2 Appeal in terms of section 20 of the **MHSA**

If the employee is not satisfied with the process as mentioned in 8.2.2 above, the employee still have the right to, in terms of Section 20 of the **MHSA** lodge an appeal to the Medical Inspector.

8.3.3 Flowchart outlining the management of employees with medical incapacity process



8.3.4 Competencies

The **COP** must recommend that personnel involved in the process of **medical incapacity management** should, where appropriate, have adequate knowledge and skills in the following:

- 8.3.4.1 Legal obligations related to employees with **medical incapacity and/or disability**;
- 8.3.4.2 making structured early return to work recommendations;
- 8.3.4.3 coordination, synchronization, case management and communication relating to medical treatment and rehabilitation;
- 8.3.4.4. workplace assessment for **reasonable accommodation** of employees with **medical incapacity and/or disability**;
- 8.3.4.5. health Risk Assessment practices for employees with **medical incapacity**;
- 8.3.4.6. **Health Impact Assessment** practices for employees with **medical incapacity**;
and
- 8.3.4.7. **assessment of medical impairment and disability**.

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 organizational structures, responsibilities of functionaries and programs and schedules for this **COP** that will enable proper implementation of the **COP**.

NOTE:

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 purpose of risk assessment.

2. COMPLIANCE WITH THE CODE OF PRACTICE

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

3. ACCESS TO THE CODE OF PRACTICE 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.
- 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 responsibility.

ANNEXURE A: Legislative framework

(This annexure is for informational purpose)

The following legislation should be considered where an employee with **medical incapacity** is identified and who requires some management program because he/she cannot do his/her work;

1. The Constitution of South Africa

The Constitution is the highest legal authority in South Africa. It includes a Bill of Rights setting specific protections.

The Labour Rights are as follows:-

- Equality (Section 9)
- Human Dignity (Section 10)
- Labour Relations (Section 23)

2. General labour rights

The general labour rights include the right to:

- Work.
- Fair remuneration and conditions of service.
- Access to training.
- Belong to a trade union.
- Bargain collectively.
- Withhold labour.
- Protection of safety and health.
- Security against unemployment or injury on duty.
- Job security.
- Protection against unfair labour practices.
- Protection against unfair discrimination.

3. Common law principles

Rights not specifically protected in current legislation may offer protection in common law principles. It is important to consider such principles that may be applicable on specific cases. Generally employee rights are far more governed and protected by legislation. Equally so are those of employers. It is important to note that such protection

is generally applicable on independent contractors as they are not defined as employees by the applicable legislation.

4. Employment contract

The duties of the employer are:

1. To pay the employee for work done.
2. Provide safe and healthy working conditions.
3. To provide the employee with work.
4. Not to make the employee do work of a lower status than the employee was employed for.
5. Not to contract the employee to another employer without the employee's consent.

The following are duties of the employee:

1. To perform his/her work diligently.
2. To obey all reasonable orders and work rules.
3. Not to deal dishonestly with the property of the employer.
4. May not compete with the employer in respect of business.

5. Labour Relations Act: Requirements of Schedule 8

The Labour Relations Act, 1995, by means of its Code of Good Practice (Section 10 of Schedule 8), codifies a process relating to an employee's incapacity due to ill health or injury. Provision for the Code is made in Section 203 of the LRA, which also reads that "any person interpreting or applying LRA must take into account any relevant code of good practice. The Dismissal Code has specific provisions for "ill-health and injury", and a body of practices which have become known as 'incapacity management' has evolved over time based on these provisions in the Dismissal Code. It differentiates between good practices in situations of temporary or permanent incapacity. In terms of this Code, an employer's obligation can be summarised as follows:

- An employer has to determine whether an employee is temporarily or permanently unable to work.
- If the employee is temporarily unable to work, the employer should investigate the extent of the incapacity to find alternative solutions short of dismissal, to accommodate the employee. This includes investigating the nature of the job, the expected length of absence, the seriousness of the illness, and the possibility of a temporary replacement.

- If the **incapacity** is permanent, the employer should ascertain the possibility of securing alternative employment or adapting the duties or work circumstances of the employee to accommodate such employee's incapacity
- In any investigations related to **incapacity**, the employee should be allowed to state a case in response and to be assisted by a trade union representative or a fellow employee. It is suggested that all **incapacity** proceedings be conducted in consultation with the incapacitated employee
- The degree of **incapacity** is relevant to the fairness of any dismissal, whether for temporary or permanent **incapacity**. The cause of **incapacity** is relevant and, if the cause arises from a working circumstance, the duty of an employer to assist such an employee is greater. In the case of certain kinds of **incapacity**, such as alcoholism, drug abuse and post-traumatic stress disorder, counselling and rehabilitation may be appropriate steps for an employer to consider.
- An employer should, at all times during assessments, consider whether the employee is capable of performing the work and:
 - If the employee is not capable, the extent of the **incapacity**.
 - The extent to which the employee's work circumstances may be adapted to accommodate the **disability** or, where this is not possible, the extent to which the employee's duties may be adapted; and
 - The availability of any reasonably suitable alternative work.
 - The Labour Court has found that in order to accommodate an employee rather than to dismiss, reasonably suitable alternative employment at a reduced salary and/or job-grading is acceptable, and
 - Ultimately either the CCMA or the Labour Court will determine if any action in terms of this policy was procedurally and substantively fair.

6. **MHSA and regulations (Act 29/1996)**

Section 7 of **MHSA** prescribes that an employer should staff a mine with due regard to health and safety. It further prescribes that every employer must:-

- ensure that every employee complies with the requirements of this Act;
- institute the measures necessary to secure, maintain and enhance health and safety;
- provide persons appointed under subsection (2) and (4) with the means to comply with the requirements of this Act and with any instruction given by the inspector;
- consider an employee's training and capabilities in respect of health and safety before assigning a task to that employee; and

- ensure that work is performed under the general supervision of a person trained to understand the hazards associated with the work and who has the authority to ensure that the precautionary measures laid down by the employer are implemented.

Section 11 of **MHSA** prescribes that an employer should assess and respond to risk. It further prescribes that every employer must:

- Identify the hazards to health or safety to which employees may be exposed while they are at work;
- assess the risks to health or safety to which employees may be exposed while they are at work;
- record the significant hazards identified and risks assessed; and
- make those records available for inspection by employees.
- determine all measures, including changing the organisation of work and the design of safe systems of work, necessary to:
 - a) eliminate any recorded risk;
 - b) control the risk at source;
 - c) minimise the risk; and
 - d) in so far as the risk remains:
 1. provide for personal protective equipment; and
 2. institute a programme to monitor the risk to which employees may be exposed.
- conduct an investigation in terms of section 11(5) when serious illness or life-threatening conditions occur.

7. Employment Equity Act

- The **EE Act** identifies "people with **disabilities**" as a designated group, to remedy decades of unfair discrimination, and to redress unjustifiable imbalances in their representation in the workplace, as compared with black people, woman and males. For employers the Act therefore establishes two overall obligations in relation to people with disabilities to:
 - identify and remove unfair discrimination; and
 - increase representation.

To achieve these, the Act requires designated employers to take specific steps and actions. Each of them needs to be understood, planned and then incorporated into the organisation's Employment Equity Plan to be implemented in line with an agreed strategy over time. These requirements are the following:

- increase the representation of employees with **disabilities**;
- audit for unfair **disability**-related discrimination;
- conduct a workforce **disability** profile;
- afford **reasonable accommodation**;
- train;
- develop; and
- retain employees with **disabilities**.

The requirements of the **EEA** means that suitably qualified people with **disabilities** cannot be unfairly discriminated against or be subjects of questionable or unfair labour practices in employment. It is expected of the employer to report on this from time to time in the prescribed employment equity report.

Apart from the risks, equitable employment practice is the right thing for leading corporate citizens to aim for according to the strategic objectives identified by the King 3 Report.

Now the following should apply in relation to suitably qualified people with **disabilities**. They should be:

- hired they must be offered appropriate employee benefits; and
- retained where appropriate.

8. Relevant codes of practice

8.1 SA Disability Code

In addition to the **EEA**, the Department of Labour has published at the end of 2002 the final Code of Good Practice on Key Aspects of **Disability** in the Workplace. Its objective is to guide employers in their efforts to attain equity for people with **disabilities**. This Code must be read together with the HIV/AIDS Code of Good Practice issued earlier by Government.

8.2 International Labour Organisation's (ILO) Code of Practice on Disability Management

In late 2000 the first International Labour Organisation (ILO) Code of Practice on Disability Management (CGPDM) was announced. It outlines:

*"fair and equitable treatment of workers with **disabilities**, ...and the key roles and responsibilities of all the process stakeholders: employee, employer, trade unions, insurance providers. The policy focuses on return to work and job retention."*

The ILO Code must be read together with the EEA above as it outlines for organised labour and employers how to "retain" people with **disabilities** as required by the EEA. The ILO Code was ratified by the SA-government for implementation alongside our own SA Disability Code

9. The ILO recommendation

The guideline recommends that "every employer should have a plan to minimise the impact of **disablement** on the people it employs"