Black Mountain Mining

BMM-HSE-VOH-SOP-0027 Emergency Work In Abnormally Hot Environments

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BMM-HSE-VOH-SOP-0015	BMM-HSE-VOH-SOP-0027	Standard Operating Procedure	Draft
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2.0	Internal (C3)	ISO 45001:2018	Catharina Kotze

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20 April 2023	7-15-2024	2 Years	7-15-2026

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❖ Change History

Modified Date	Version	Modified by	Description of change
2023/04/20	1.0	C. Klopper	New Document
2024/07/15	2.0	L. Magerman	Review

Table of Contents

❖ Definitions and Abbreviations

Word / Phrase / Abbreviation	Definition
PEME	PEME is an acronym used in Black Mountain Mining and has the following meaning: - People, - Equipment, - Materials, - Environment, The use of this in written documentation helps to comply with Resources Clause 7 – ISO 9001, ISO 14001 and ISO 45001. It is advisable to include in all written documentation.
Hot environment	DB ≥ 32.5°C - < 37.0°C, GT ≥ 32.5°C - < 37.0°C and WB range of ≥ 27.5°C - < 32.5°C and/or the time weighted average WBGT index, determined over a period of one hour, ≥ 30 - < 34 in the environment in which an employee works
HSM	Heat Stress Management
Supervisor	Competent person in charge of workmen
EHSI	Emergency Heat Stress Index

1. PURPOSE

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.

2. SCOPE

This procedure is applicable to all the Black Mountain Mine Complex Operations, employees and contractors who are required to work in abnormally hot environments.

3. LEGAL & OTHER CONSIDERATIONS

In all instances, attention is drawn to the requirements of the Mine Health and Safety Act No. 29 of 1996 and Regulations (as amended) that are minimum requirements.

4. RESPONSIBILITIES

The programme will be reviewed every 4 years in line with the Complex Policies & Standards Committee or as and when changes are required due to any incident, illness or change management by the standards committee in consultation with the Appointed 12.1 (Shaft Ventilation Engineer/Occupational Hygienist) to reflect management commitment to, and growing understanding of, the principles of a sustainable heat stress management programme.

5. RESPONSIBLE FOR IMPLEMENTATION

It is the responsibility of the Manager appointed in terms of Regulation 3.1(a), to ensure that this procedure/code is implemented. All employees/contractors directly related to the task shall ensure that any related tasks are carried out as per requirements of this Procedure.

6. GENERAL

6.1 Contravention

Any breach of this Procedure shall be regarded as “Refusal/Failure to carry out a lawful instruction “and will be dealt with as per Disciplinary procedure. The user is free to download, print and generally use any Standard, Procedure or COP required. However, the user is prohibited from modifying or save changes unless they have written approval to do so from the Standards Co-ordinator and changes has been best practiced, signed off and approved by the Standards committee. Unauthorised modifications and prints thereof will be regarded as a most serious offence and in the event of injury or asset damage could lead to disciplinary action.

6.2 Distribution

#	Distributed to	Physical Copy	Electronic Copy
1	Production Managers	Original Hard copy: Document Controller Black Mountain Mine	Vedanta Intranet> Policies and Procedures Electronic Documents Library (BMM Intranet)
2	Section Managers		
3	Chief Safety officers		
4	HR Co-ordinators		
5	Training centre		
6	Ventilation Occupational Hygiene Managers		
7	Senior Management		
8	Middle Management		
9	Line Managers		
10	Procurement		

7. PROCEDURE

7.1 Assessment Of the Environment

In the interest 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.

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

dry-bulb = 38,2˚C and wet -bulb = 34,5˚C then EHSI = (39 + 35)/2 = 37˚C

7.1.1 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.

7.2 Selection of the Task Force

The task force should consist only of employees who are medically fit for work in abnormally hot environments or have been screened or tested for heat tolerance or acclimatised to work in heat, by conventional climatic chamber procedures for example Proto Teams 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.

7.3 Risk Assessment of the Task and General Awareness

The supervisor in charge should ensure that a risk assessment is completed with the team before any work in an abnormally hot environment can take place. Specialist input from the VOH department for example may be required to ensure that all hazards and risks are identified and the best controls are selected.

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.

7.3.1 Infrastructure

The supervisor should ensure that the following is present at the workplace:

a) Cool/Cold Water or Isotonic Drinks

b) Compressed air for the treatment of heat related illness

c) A cool area are identified where workers can rest between cycles

7.3.2 Work Rules

The supervisor should ensure that all employees engaging in the work should ensure that 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.

Employees are closely monitored and 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.

The supervisor should ensure that rest-work cycles are implemented to ensure rotation of employees.

The supervisor should ensure that all controls identified for implementation during the work in the environment are implemented and effective.

8. HISTORY OF CHANGES

Reason for Change - Index	
A. As a result of incidents	B. As a result of audit findings
C. New / changes in governance documents	D. Changes in legislation
E Changes in technology	F. Changes in machinery/equipment
G Results of risk assessments	H. Change in training requirements
I. New document format	J. Change due to spelling or grammatical error
K. To integrate a special instruction into the document control system	

Date of change	**Revised Item (Paragraph number)**	**Changes Made**	**Reason Code**	**Name of reviewer**

9. RECORD CONTROL

Records to be maintained in accordance with this Procedure

Identification	**Reference number**	**Responsible for filing**	**Responsible for**	**Location of storage**	**Retention period**	**Method of disposal**

			maintenance	area		

10. VALIDITY AND DOCUMENT MANAGEMENT

10.1 Document Validity

This SOP is effective from 2023/04/20 and was last reviewed on 15-07-2024. This SOP will be reviewed every 2 Years.

10.2 Document Management

10.2.1 This SOP replaces any other SOP issued earlier by BMM to the extent specifically covered here. This SOP should be followed in letter and spirit.

10.2.2 BMM is committed to continuously reviewing and updating policies and procedures, based on the Entity's risk assessment and shall incorporate for any regulatory requirement which is required to do so.

10.2.3 Any amendment to this SOP or issue of any guidance or circular etc. under this procedure must be approved in writing by the approving authority as listed in this document.

10.2.4 BMM reserves the right to withdraw, modify or revise the SOP as a whole / partial without providing any justification for the same. On revision, it should be duly communicated to the personnel involved.

10.2.5 If compliance with this SOP ever conflicts with the applicable law, regulation, directives issued by the statutory and or regulatory authority, then compliance must be ensured with the law.

10.2.6 In order to ensure compliance or to address any known conflicts with the law or to address any specific local requirements, BMM may adopt local sub-procedures which shall be by way of addendum to this SOP and which shall be approved by the approver of this SOP. Proposing of such addendum shall be the responsibility of the respective Entity’s competent authority who is at an equivalent level with the SOP owner as set out in this document.

10.3 Violation of Sop

10.3.1 BMM follow a “Zero Tolerance Policy” with respect to non-compliance with this SOP and/or any other SOP / guidance issued by BMM and its constituent Entities.

10.3.2 Violation of this SOP is subject to appropriate disciplinary actions which may include but not limited to termination of employment. This determination will be based on the facts and circumstances of each situation. Any accused of violation of this SOP will be given an opportunity to present their case prior to any determination of appropriate disciplinary actions. Violation of this SOP may also be subject to substantial civil damages, criminal fines and prison terms.

10.3.3 Each employee is responsible for ensuring that their conduct and the conduct of anyone reporting to them shall fully comply with this SOP. Compliances, both personal and by subordinates, will be a factor in periodic performance appraisals.

10.4 Disclaimer

10.4.1 This SOP issued by BMM is for internal compliance and does not create, nor shall it be construed to create, directly or implicitly, any rights, duties or obligations of BMM to any person, body or legal Entity.

10.4.2 This document and its contents are the copyright property of BMM. The release of this document to any third party outside BMM is strictly prohibited without prior consent.

11. REVIEW AND APPROVAL

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This document was approved (in sequence) by the individuals above using electronic approval in our Document Control System.

Final approval status: **Draft**

Approvals were done electronically.

❖ Annexures / Appendix

EHSI Chart

The E.H.S.I. chart is used to determine the maximum tolerance time measured in minutes a Rescue Team Member may be used for strenuous work in temperatures ranging from 28°C to 45°C.

EMERGENCY HEAT STRESS INDEX CHART (EHSI)

1. Take Wet Bulb Temperature = 35,4˚C
   *Round up = 36 ˚C
2. Take Dry Bulb Temperature = 37,6 ˚C
   *Round up 38 ˚C
3. Add both Results and take Average
   * i.e. 36 ˚C + 38 ˚C = 74 ˚C
   ♣Average = 37 ˚C EHSI
4. Determine the Maximum Tolerance Time (Min) on the Chart

RESULT:

1. No Cooling Garment = 25 min
2. With Cooling Garment = 55 min

Note: Recommended Limits are based on experimentally determined limits in the interest of convenience to cater for moderate and strenuous work

INDEX CHART:

For Rescue Team Members Performing Strenuous Work During Emergencies

EHSI ˚C	Maximum Tolerance Time (min)	
	Without Cooling	With Cooling
28-29,9	No Limit	Not Applicable
30	230	Not Applicable
31	180	210
32	140	170
33	110	140
34	85	114
35	60	90
36	40	70
37	25	55
38	No Work Without a Body Cooling Garment	30
39		30
40		25
41		24
42		23
43		21
44		20
45		Risk Assess

≥45°C Consider mitigating factors / Risk Assess the situation with reference to the tolerance times for various EHSI levels