Black Mountain Mining

BMM-HSE-VOH-SOP-005A Occupational Medical Surveillance V6

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BMM-HSE-VOH-SOP -0016	BMM-HSE-VOH-SOP-005A	Standard Operating Procedure	Approved
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❖ Change History

Modified Date	Version	Modified by	Description of change
2016/09/23	3.0		Change to new format Included diagrams
2019/08/19	4.0		Change to new format
2022/01/21	5.0		Updated persons to sign off
2024/07/08	6.0	L. Magerman	Annual review and new template
2024/11/11	6.0	C Klopper	Included the management & control of TB in separate SOP
2025/02/24	7.0	C. Klopper	Amended & expanded on internal/on-site transfer (movement) medicals

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❖ 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.
Assessment	A program of measurement to determine any risk from exposure to hazards at the workplace in order to identify the steps needed to be taken to remove, reduce or control such hazard
Audiologist	An individual qualified as a specialist to undertake advanced testing and diagnosis and confirmation of hearing defects
BMM	Black Mountain Mine
COF	Certificate of Fitness (e.g.: Pre-employment, periodic, blood lead & exit medicals)
DMRE	Department of Mineral Resources & Energy
Employee	Includes both BMM and Business Partner (Contractor) employees
Exposure	State or condition of being unprotected and open to damage, danger, risk to health
Hazard	Source of potential damage, harm or adverse health effects on something or someone under certain conditions at work
Health	Being not only the absence of disease, but also rather the complete physical, mental and social wellbeing of the individual.
HPD's	Hearing Protection Devices
MB ChB	Bachelor of Medicine, Bachelor of Surgery
MHSA	Mine Health & Safety Act (Act 29 of 1996 as amended)
MOHAC	Mining Occupational Health Advisory Committee
NIHL	Noise Induced Hearing Loss
Novice	An individual with no prior experience of mining as a career
OMP	Occupational Medical Practitioner
OHC	Occupational Health Clinic
OHN	Occupational Health Nurse
OSHA	Occupational Safety and Health Administration
SOP	Standard Operating Procedure
STS	Standard Threshold Shift
RBME	Risk Based Medical Examination
Risk	Chance or probability that a person will be harmed or experience an adverse health effect if exposed to a hazard
STS	Standard Threshold Shift
VOH	Ventilation & Occupational Hygiene

1. PURPOSE

The purpose of the Occupational Medical Surveillance procedure is to have in place systems to for the evaluation and management occupational medical examinations, thus reducing the risk of injury and illness, as well as to inform and guide on the procedures to follow for Occupational Medical Surveillance, the placement of employees based on their medical condition as well as the placement of pregnant or breastfeeding females.

2. SCOPE

This procedure applies to all Black Mountain Mine employees as defined.

3. PROCEDURE

3.1 Introduction

The SOP requires that all employees (Direct and Business Partner) undergo the required initial (pre-employment), periodic, exit, transfer or other (ad hoc) occupational medical examinations, as appropriate/prescribed by the OMP.

For prospective/new employees, the medical examination will include baseline tests aligned to the potential health hazards or exposures of the envisaged occupation and to the results of any relevant risk assessments.

Medical examinations are Risk-Based Initial, periodic, exit, transfer or other occupational medical Occupational medical examinations could include, but not be limited to:

a) Medical Examinations and Observations, including: Blood pressure; height; weight
b) Audio
c) Lung Function
d) Biological Monitoring (eg: Blood lead)
e) Vision
f) Chest X-Ray
g) Urine tests including a multi-level drug test
h) Other Blood tests as appropriate: Blood glucose; HbA1C, Cholesterol
i) Physical Work Capacity testing
j) Stress or resting ECG as appropriate

The OMP will ensure that serving employees are examined at intervals appropriate to the:

a) Health hazards they are exposed to
b) Inherent requirements of their specific occupation
c) Results of any relevant risk assessment

3.2 Related COP's, Standards, Procedures and Other Documents

a) Black Mountain Mining Occupational Health Baseline Risk Assessment & Health Improvement Plan

b) BMM-HSE-VOH-COP-002C Prevention, Mitigation and Management of COVID-19

c) BMM-HSE-VOH-COP-005: Minimum Standards of Fitness to Perform Work at a Mine

d) BMM-HSE-VOH-COP-003: Occupational Health Programme for Noise

e) BMM-HSE-VOH-COP-004: Occupational Health Programme on Thermal Stress

f) BMM-HSE-VOH-COP-006: Occupational Health Programme on Personal Exposure to Airborne Pollutants

g) BMM-HSE-VOH-COP-008: Risk-Based Fatigue Management

h) BMM-HSE-VOH-SOP-0028 Management & Control of TB in SAMI

i) BMM-HSE-VOH-SOP-021: Ergonomics

j) BMM-HSE-VOH-SOP-005B: Standard Threshold Shift in Medical Surveillance of Noise Induced Hearing Loss

k) BMM-HSE-VOH-SS-005A and B: Job Placement Medical Guide Matrix

l) BMM-HSE-VOH-BMS-105: Management of Blood Lead Levels and over exposure to Airborne Lead

m) BMM-HSE-VOH-BMF-005: Occupational Hygiene Exposure Profiles

n) BMM-HSE-VOH-SOP-005B: Standard Threshold Shift in the Medical Surveillance of Noise Induced Hearing Loss

o) BMM-HSE-VOH-BMF-144 Blood Lead Questionnaire A & B

p) HR policies, procedures, documents

q) Occupational Risk Exposure Profiles (OREPs)

3.3 Examination Intervals

The following applies:

<table>
<tr><th colspan="3">Periodical Examination - No health ILLNESS OR IMPAIRMENT</th></tr>
<tr><th>FREQUENCY</th><th colspan="2">FUNCTION</th></tr>
<tr><td>Two Yearly</td><td colspan="2">Chest X Ray for persons in low-risk categories
Audio for persons in low-risk categories
Lung Function for persons in low-risk categories</td></tr>
<tr><td rowspan="2">Annually</td><td colspan="2">Chest X Ray
Lung Function
Audio
Biological Sampling
Vision (Operators, Drivers & Cat 5 Employees)</td></tr>
<tr><td colspan="2">Hepatitis B Immunity for Food Handlers & Sanitation Workers
(or any potential risk as determined through the risk assessment)</td></tr>
<tr><th colspan="3">BLOOD LEAD MONITORING (Refer to VOH-STD-105 for details on Blood Lead Monitoring)</th></tr>
<tr><th>FREQUENCY</th><th>WHOM</th><th>FUNCTION</th></tr>
<tr><td>Annual</td><td>All employees</td><td>• Part of periodic medical surveillance</td></tr>
</table>

	Males:	• Below the action limit (30ųg/dl)
	Females:	• Females not capable of procreation (action & withdrawal levels as for females capable of procreation)
3-monthly	Females:	• Capable of procreation below the action limit (10ųg/dl)
	All newly appointed employees during the first year of employment (even if blood lead levels are below the BMM standards)	
Monthly	Males:	At or above the action limit (30ųg/dl)
	Females:	• At or above the action limit (10ųg/dl) • Pregnant and breastfeeding
Discretion of OMP	Males:	• At or above the withdrawal limit (35ųg/dl)
	Females:	• At or above the withdrawal limit (15ųg/dl)
Note: Blood lead monitoring will also be done during pre-employment and exit medical exams		
Periodical Examinations – Identified Health ILLNESS OR IMPAIRMENT		
As prescribed by the OMP		
AD HOC Medical Examinations		
Post-Accident Evaluation	Underlying Medical Cause Biological Monitoring & Testing	
Referral by Management for potential health related problems	Substance Abuse Absenteeism Redeployment Transfer Medical (Job Change or site change) Medical Incapacity	
Change of Health Status	Sickness / Injury	
Transfer (movement) between occupations &/or work locations within the same employer within Black Mountain (Pty) Ltd business units (but not between employers)	A Risk-Based Occupational Medical examination conducted prior to an employee moving from one occupation to another or from one work location to another within Black Mountain (Pty) Ltd operations. Note: In the event an employee “moves” between ***employers*** within Black Mountain (Pty) Ltd operations, an “exit medical examination” will be conducted for the “current” employer and an entry medical for the “new” employer.	
Referral: From any Medical Practitioner		
Exit Medical Examinations		
All persons, when leaving employment of their current employer for whatever reason, must undergo an exit medical examination. This includes “movement” between employers within Black Mountain (Pty) Ltd operations. Repeat above examinations unless these have been done within the last six months - If no meaningful previously identified health problems (abnormalities) exist.		

3.4 Legislative Requirements

The following legislative requirements has reference:

a) MHSA - Act 13: Employers to establish system of medical surveillance

b) MHSA - Act 14: Record of hazardous work

c) MHSA - Act 15: Records of medical surveillance
d) MHSA - Act 16: Annual medical reports
e) MHSA - Act 17: Exit certificates
f) MHSA - Act 18: Cost of examination
g) MHSA - Act 19: Employee's right to information
h) MHSA - Act 20: Employee may dispute finding of unfit to perform work
i) MHSA - Regulation 11: Occupational Health

3.5 Risk Management

An Occupational Health Baseline Risk Assessment was conducted. Periodic reviews and updates of the baseline risk assessment will be conducted as and when required. Issue based Risk Assessments will be carried out for all new equipment to ensure that the exposure to ergonomic stress is minimized through the identification of critical controls.

4. Communication & Control

4.1 Restrictions & Renewals

a) No employee shall be allowed to perform work at Black Mountain Mining (Pty) Ltd without a valid Certificate of Fitness (COF) issued by the Occupational Medical Practitioner (OMP) or his/her delegate.

b) In order for a person to obtain or renew their COF, he/she will be assessed against the requirements as is set out in this procedure and any other related COP's, SOP's or mine standards. Final discretion of 'fit to work' will be with the OMP.

c) Employees, HR and Line Management are responsible for the timely renewal of their COF at frequencies determined by the OMP.

d) Line managers / supervisors shall make the necessary work schedule arrangements with the employees and ensure that employees make the appointments and attend the renewal for the COF at the Occupational Health Clinic.

e) Line managers / supervisors with the employees are urged to make the appointments for COF renewals well in advance.

f) The Occupational Health Clinic should be contacted directly for renewal of COF.

g) Pre-employment, movement and exit medicals will be arranged through HR department.

4.2 Access Control

Access into the workplace will be controlled through "Time and Attendance Access Control System", managed by the Time Office / HR department.

a) No employee will be allowed into a workplace without a valid COF. The biometric clocking (and turnstile) system will "block" a person from accessing the workplace should a persons COF have expired.

b) No employee will be permitted to clock another employee into the workplace.

c) Biometric Access:

- New employees: biometric clocking access will only be activated by the Time Office / HR department after a new employee has been declared "fit for work", and the "Fit for work" declaration slip has been handed in or emailed to the Time Office / HR department.
- Employees attending periodical examinations: biometric clocking access will be re-activated by the Time Office / HR department after the employee has been declared "fit for work", and the "Fit for work" declaration slip has been handed in or emailed to the Time Office / HR department.

d) Visitors will be granted with a "Visitor's access" by the Security Department.

4.3 Notifications

a) Direct Employees: The HR Workflow system will notify the relevant supervisor in advance via email of the expiry of an employee's Certificate of Fitness (COF) and that the relevant supervisor notifies, plans and make the appointment with the clinic for the COF renewal in advance.

b) Business Partner Employees: Each Business Partner is required to implement and maintain a system to ensure they monitor expiry dates of COF's and that the relevant supervisor and employee is notified in advance in order to plan and make the appointment with the clinic for the COF renewal.

c) Direct & Business Partner Employees: COF expiry date notifications are displayed at access gates (turnstiles) when an employee clock in/out. This notification is displayed during the last 10 days before expiry of the certificate. If an employee does not renew the COF during this period and the "Time and Attendance Access Control System" updated accordingly, the employee will be denied access through the gate on the COF expiry date.

d) On completion of the COF, a "Statement of Fitness to work" declaration slip is issued to the employee by the Occupational Medical Clinic. The employee must submit (hand in) the "Statement of Fitness to work" declaration slip to their respective HR representative, who will review the content thereof, including the "statement of fitness" and action accordingly, including notifying the employee's supervisor of should any restrictions be noted on the statement of fitness.

e) The respective HR representative will submit (email) a copy of the statement of fitness slip to the BMM Time Office, who will update the relevant records and "Time and Attendance Access Control System" accordingly, including restricting the employee to clock in at certain areas.

5. Occupational Medical Surveillance

A risk-based medical surveillance programme was developed and implemented in consultation with the OMP. The general purpose of the programme is to determine whether any medical &/or physical contra-indications exist that could preclude a prospective or existing employee from working in an environment with an established and well-defined health &/or safety hazard. An integrated approach is followed to avoid duplication by combining Risk-Based Medical Examinations (RBME's) and other medical procedures, where applicable. As such, the RBME's becomes part of the employee's medical history and medical surveillance record.

Occupational Medical Surveillance information is recorded on BMF009 forms for record keeping.

The following medical examinations forms part of the surveillance programme:

a) Initial examination in terms of **Section 13(2)(c) of the MHSA**

- Conducted prior to employing a person to determine if he/she is fit to perform the prospective occupation

b) Periodic examination in terms of **Section 13(2)(c) of the MHSA**

- Conducted at set intervals, e.g. annual, to review a persons current "fit to work" status and if any occupational illness or impairment could be present
- This includes biological monitoring (e.g. blood lead; pregnancy tests for females)

c) Exit examination in terms of **Section 17 and 19(2) of the MHSA**

- Conducted when an employee leaves the employment of their current employer for whatever reason.
- In the event a person moves between employers within Black Mountain (Pty) Ltd, the medical examination could serve as both the "exit medical examination" from the current employer as well as the "entry medical examination" for the new employer.

d) Risk-based Transfer (movement) Medical Examinations

- Conducted when an employee is transferred between occupations &/or work locations within the same employer within Black Mountain (Pty) Ltd business units.
- The following applies to Transfer medicals:
  i. The respective HR department of the employee will make the required appointment with the occupational medical clinic and complete the required documentation indicating the new occupation &/or work location of the employee.
  ii. The employee is required to attend the Transfer medical as per appointment date.
  iii. A Risk-Based Medical Examination (RBME) will be conducted for the employee to determine if the employee is fit for the "new" occupation &/or

work location. The type of medical examinations performed will be based on the new occupation &/or location of work.

iv. The outcome of the RBME will be communicated to the respective HR department.

e) Other / “Out of Cycle” medicals – this relates to medical surveillance for specific individuals based on their medical condition as specified by the OMP

5.1 Frequency & Type of Medical Examinations

The frequency and type of medical examinations performed depend on a number of factors, including:

a) The individual – for example: age, medical history & physical capabilities

b) Type of Occupation performed

c) Work location

d) Specific risks associated with the occupation / workplace

The medical surveillance programme is set out below. However, depending on the examination required, only relevant sections of the surveillance programme could be performed at times.

5.2 Initial Interview

An initial interview is conducted to note historic medical and employment information, and includes:

a) Employer history

b) Occupational history

c) Any related occupational diseases

d) Any related medical condition, especially where treatment is based on medication which is likely to increase susceptibility to heat disorder significantly

e) Any other condition that might have an influence on the persons COF

5.3 Physical Evaluation

The occupation and work area are taken into account when conducting the physical evaluation. Special emphasis is placed on features which could rule out physical work or exertion in heat (the appropriate OREP and Guideline for the COP on Thermal Stress was consulted in compiling parts of the “Physical Evaluation”).

5.3.1 Age

Age of a person is taken into account especially for strenuous work and work in hot environments.

5.3.2 General Medical Examination & Physical Appearance

Any apparent physical deformity (e.g. congenitally acquired) or injury (e.g. amputations or joint malfunction) will be recorded. Where, in the opinion of the OMP, such deformity or injury precludes the employee from performing his work without undue physical discomfort, it will be stated clearly. The following options exist:

a) Fit without restrictions

b) Fit with restrictions (temporary or permanent).

c) Unfit for any form of physical work (temporary or permanent)

In addition, the following will also be examined in relation to working in hot environments:

a) Any infection.

b) Ear, nose and throat examination will exclude abnormalities such as perforations, etc.

c) No organomegaly or hernias should be present

d) Sexually transmitted disease should be absent

e) Gross neurological examination should be normal

f) No other abnormality that may compromise physical work in heat should be present

g) Any cardiovascular abnormalities such as ischemic heart disease

5.3.3 Body Dimensions

Weight (body mass) and height information are determined by:

a) Weight (kg): an appropriate scale

b) Height (m): the use of a “height slide scale” fixed to the wall.

Body Mass Index (BMI): Body mass relative to height and is used as it provides a better indicator of disease risk than weight alone:

BMI = Body mass (kg) / Height (m) ^{2}

BMI Classification:

a) < 15 : emaciated

b) 15 – 19 : underweight

c) 20 – 25 : normal

d) 26 – 29 : overweight (warning)

e) 30 – 35 : obese (overt risk factor)

f) > 35 : OMP discretion, risk based

BMI is used in conjunction with the effective body mass to assess the adequacy of body dimensions relevant to physical work in a hot environment. Distinction is made between prospective or new employees (‘novice’ to mining). The following criteria are applicable with regards to work in hot environments:

a) An acceptable body mass to height ratio to rule out both under- and overweight individuals

b) Minimum body mass as a criterion of the capacity to cope with externally imposed work demands

Refer to the table below for Body dimensions as a guide for physical work in hot environments and BMI charts:

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

[1]Novice - An individual with no prior experience of mining as a career

[2]Strenuous work – Any form of work in 'hot' environments where the work rate exceeds 160W.m^{-2}

[3]Unsuitable

BODY MASS INDEX

Mass (kg)

Height (m)	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	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
1.9	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	19	19	19	19	20	20	20	21	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
1.8	15	16	16	16	17	17	17	18	18	18	19	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	21	22	22	22	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
1.7	17	18	18	18	19	19	19	20	20	20	21	21	21	22	22	22	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
1.6	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	28	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	30	31
1.52	22	22	23	23	23	24	24	25	25	26	26	26	27	27	28	28	29	29	29	30	30	31	31	32
1.5	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)

Height (m)	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	19	19	19	19	20	20	20	20	21	21	21	21	22	22	22	22	23	23	23	23	24	24	24	24
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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
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1.58	30	30	30	31	31	32	32	32	33	33	34	34	34	35	35	36	36	36	37	37	38	38	38	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
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
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
1.5	33	33	34	34	35	35	36	36	36	37	37	38	38	39	39	40	40	40	41	41	42	42	43	43

BODY MASS INDEX

Mass (kg)

Height (m)	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
2	25	25	25	25	26	26	26	26	27	27	27	27	28	28	28	28	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	30	30	30	30	31
1.96	26	26	26	26	27	27	27	27	28	28	28	28	29	29	29	29	30	30	30	30	31	31	31
1.94	26	26	27	27	27	27	28	28	28	28	29	29	29	29	30	30	30	31	31	31	31	32	32
1.92	27	27	27	27	28	28	28	28	29	29	29	30	30	30	30	31	31	31	31	32	32	32	33
1.9	27	27	28	28	28	29	29	29	29	30	30	30	30	31	31	31	32	32	32	32	33	33	33
1.88	28	28	28	29	29	29	29	30	30	30	31	31	31	31	32	32	32	33	33	33	33	34	34
1.86	28	29	29	29	29	30	30	30	31	31	31	32	32	32	32	33	33	33	34	34	34	34	35
1.84	29	29	30	30	30	30	31	31	31	32	32	32	32	33	33	33	34	34	34	35	35	35	35
1.82	30	30	30	30	31	31	31	32	32	32	33	33	33	34	34	34	34	35	35	35	36	36	36
1.8	30	31	31	31	31	32	32	32	33	33	33	34	34	34	35	35	35	35	36	36	36	37	37
1.78	31	31	32	32	32	33	33	33	33	34	34	34	35	35	35	36	36	36	37	37	37	38	38
1.76	32	32	32	33	33	33	34	34	34	35	35	35	36	36	36	36	37	37	37	38	38	38	39
1.74	32	33	33	33	34	34	34	35	35	35	36	36	36	37	37	37	38	38	38	39	39	39	40
1.72	33	33	34	34	34	35	35	35	36	36	37	37	37	38	38	38	39	39	39	40	40	40	41
1.7	34	34	35	35	35	36	36	36	37	37	37	38	38	38	39	39	39	40	40	40	41	41	42
1.68	35	35	35	36	36	36	37	37	38	38	38	39	39	39	40	40	40	41	41	41	42	42	43
1.66	36	36	36	37	37	37	38	38	38	39	39	40	40	40	41	41	41	42	42	42	43	43	44
1.64	36	37	37	38	38	38	39	39	39	40	40	41	41	41	42	42	42	43	43	44	44	44	45
1.62	37	38	38	38	39	39	40	40	40	41	41	42	42	42	43	43	43	44	44	45	45	45	46
1.6	38	39	39	39	40	40	41	41	41	42	42	43	43	43	44	44	45	45	45	46	46	46	47
1.58	39	40	40	40	41	41	42	42	42	43	43	44	44	44	45	45	46	46	46	47	47	48	48
1.56	40	41	41	42	42	42	43	43	44	44	44	45	45	46	46	46	47	47	48	48	48	49	49
1.54	41	42	42	43	43	43	44	44	45	45	46	46	46	47	47	48	48	48	49	49	50	50	51
1.52	42	43	43	44	44	45	45	45	46	46	47	47	48	48	48	49	49	50	50	51	51	52	52
1.5	44	44	44	45	45	46	46	47	47	48	48	48	49	49	50	50	51	51	52	52	52	53	53

5.4 Vision Screening

Vision testing is done using either one or a combination of the following and must comply with the parameters set in “SS003: Guideline for Job Placement Evaluation” as a minimum:

a) Snellen or Illiterate Eye charts

b) Keystone

c) Isihara

5.5 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 ischemic heart disease or uncontrolled hypertension are not suitable for employment as drivers of passenger or dangerous goods conveyances.
- A Physical Work Capacity (PWC) screening may be recommended by the OMP as an objective assessment of the cardiovascular system
- An Electrocardiogram (ECG) will be conducted for all prospective or current employees with any cardiac risk history, symptoms or conditions shown during special medical investigations. Should cardiac risk abnormalities be identified, the person will be referred to more specialized medical facilities for additional testing.

5.6 Blood Pressure Monitoring

Blood pressure (hypertension) monitoring is done with the use of appropriate equipment.

Persons with Hypertension of >140/90 will be further investigated by the OMP in order to specify means of control. In cases where blood pressure stays abnormally high, such persons could be temporarily or permanently excluded from certain occupations

5.7 Lung Function Testing

The “Guidance Note for Occupational Medical Practitioners – Lung Function Testing” (reference number 25/5/P as issued by the DME – September 2003) is used as the bases for the testing of Lung function. The following apply:

5.7.1 Spirometry Test

a) An objective test of lung function through the measurement of the volume of air inspired and expired over a period of time.

- An individual exhale forcible from total lung capacity (maximum inspiration) to residual volume (complete exhalation).
- This procedure is repeated until test acceptability criteria are met, or eight adequate attempts have been made.

b) Measurements include

- FEV1: Forced expiratory volume in one second.
- FVC: Forced vital capacity is the maximum volume of air exhaled with forced effort from maximal inspiration.
- FEV1/FVC: Expressed as a percentage.

5.7.2 Procedures

To ensure accurate results, the following procedures are followed:

a) Requirements to conducting tests:

- Persons being tested will be advised not to smoke at least one hour prior to testing.
- A person competent in Spirometry will conduct the tests.
- Collect data for BTPS (body temperature & pressure at sea level) – Determine ambient temperature using a room thermometer and barometric pressure as required by the OEM.

b) Instrument calibration and inspection are as follows:

- A daily leak test is conducted on the 3-litre syringe to ensure correct operation, following which a leak test is conducted on the spirometry equipment.
- Should more than 50 tests be conducted in a day, an additional leak test will be conducted on the spirometry equipment to ensure correct functionality.
- Flow is calibrated as per OEM's instructions.

c) The test procedure will be explained to individuals, including:

- Full inspiration (inhalation).
- Mouthpiece inside mouth, avoiding leaks and blowing as if into a trumpet.
- Keep exhaling forcefully from the beginning until instructed to stop.
- Two practice efforts will be given.
- Persons being tested will always be in an upright position.

d) Good hygiene practices are enforced through:

- The use of disposable mouthpieces.
- The use of disposable gloves.

e) Obstructive Abnormalities observed during tests will be handles as follows:

- 400 micrograms of salbutamol will be administered per inhaler
- Repeat tests after 15 minutes.
- This test is performed as a means to evaluate the reversibility of the obstructive abnormality.

5.7.3 Criteria for Test Acceptability:

a) Acceptability criteria:

- Minimum exhalation time of 6 seconds.
- If greater than 0.05L is exhaled in the last second (between 5 & 6 seconds), then exhalation time should continue.
- The test must demonstrate a satisfactory start, smooth continuous exhalation, with maximum effort and without coughing, early termination, leak or obstruction to mouthpiece.

b) Reproducibility criteria:

- A minimum of 3 acceptable efforts must have FEV1 and FVC within 5% of the best efforts.

c) A maximum of 8 expiratory efforts per session.

d) BTPS (body temperature & pressure at sea level) correction factors will be applied (to correct for the influence of altitude and temperature on gas volumes).

e) People incapable of performing reproducible Spirometry:

- Studies have shown that about 5% of any population is incapable of performing an acceptable test, even after 8 efforts.
- If a person fails to perform an acceptable test because of failure to meet the reproducibility criteria, the test will be repeated again after two weeks.
- If a person still fails to produce an acceptable test then the best values achieved will be recorded with the comment "poor reproducibility".
- Clinical judgment will be used in the valuation of such persons.

5.7.4 Results & Records:

a) The best value achieved for FEV1 and FVC in acceptable tests will be recorded. The two values do not need to be from the same effort.

b) Values will be recorded in litres to two decimal places.

- A copy of the test print-out will be placed on the employee's medical record, including the person's name, the date, height and, if available, BTPS factor used.

c) The best value obtained will be compared to a predicted or reference value, accounting for age, gender and height:

- Best FEV1 measured / FEV1 predicted (expressed as a percentage).
- Best FVC measured / FVC predicted (expressed as a percentage).

d) Baseline Spirometry tests:

- A Spirometry test performed on initial examination, or on initiation of Spirometry as part of medical surveillance, or any other test at which the values for Spirometry are the best ever recorded for that employee.

e) If subsequent Spirometry tests show evidence of an accelerated annual decline in lung function (see 8.5.6, section c) from the baseline spirometry test, clinical evaluations will be performed.

5.7.5 6.5.5 Predicted or Referenced Values for Spirometry:

As no universally accepted practice for Spirometry exists currently in South Africa, the OMP uses the following criteria for judgment:

a) ECCS (European Community for Coal & Steel) reference values are used for people of European ethnic origin. The relevant equations for males are as follows:

- FEV1 (litres) = 0.058 x height (cm) – 0.027 x age (years) – 4.34
- FVC (litres) = 0.043 x height (cm) – 0.029 age (years) – 2.49

5.7.6 Criteria for Interpretation of Spirometry Results:

5.7.6.1 Normal or acceptable results

a) Interpretation of Spirometry results will only take place with the assurance that correct procedures have been followed and an acceptable test is being interpreted.

b) A Spirometry test is normal or acceptable if:

- Best FEV1/Best FVC ≥ 75%; and
- Best FVC ≥ 80% predicted value; and
- There is less than 200ml averaged annual decline in FEV1 or FVC; or
- There is less than 10% decline in FEV1 or FVC from the initial or baseline spirometry test.

5.7.6.2 Characterizing abnormal spirometry results

a) Obstructive Abnormality:

- This is when the FEV1/FVC ration is below the normal range, indicating an airflow limitation through the airways.
- The severity is graded on the basis of best FEV1 as a percentage predicted.
  - ➢ *Reversibility*: an obstructive abnormality is deemed reversible if there is 15% or greater increase in the FEV1 following administration of salbutamol (see 8.5.2, e).

b) Restrictive Abnormality:

- This is inferred if there is a reduction of FVC without a reduction of the FEV1/FVC ratio.
- This may indicate lung tissue or chest wall problems or may be a non-specific finding.
- The severity is graded on the basis of best FVC as a percentage predicted.

c)Mixed Obstructive & Restrictive Abnormality:

- This is interpreted when there is both reduced FEV1/FVC ratio and a reduction of FVC.
- This may indicate problems both in the airways and the lung tissue.
- The severity is graded on the basis of either best FEV1 or best FVC as a percentage predicted, with the worst of the two results determining the grade.

5.7.6.3 Accelerated Annual Decline in FEV1 or FVC:

a) This is interpreted when the decline in an individual’s FEV1 or FVC exceeds an annual average of 200ml (0.2L) between tests.

- The normal rate of annual decline in these parameters is about 40ml per year.
- Normal people can be expected to show a 10%, but less than 15%, decline in observed lung volumes during the 20 years from age 20 to 40.
- Charts can be consulted for more precise estimations of annual decline in lung function.

5.7.6.4 Grading the Severity of Spirometry Abnormality:

a) Spirometry has a modest correlation with ability to perform work as indicated by performance in formal exercise testing, and is therefore viewed as a broad, rather than a precise indicator of fitness to perform work.

b) Spirometry abnormalities can be graded as mild, moderate or severe. Grading is according to the index (FEV1, FVC or FEV1/FVC) indicating the most impairment of lung functions. The recommendations by the American Thoracic Society (ATS) is used as a guide:

- Mild Impairment: Not usually associated with diminished ability to do most jobs.
- Moderate Impairment: Progressively lower lung function associated with diminished ability to meet the physical demands to many jobs.
- Severe Impairment: Unable to meet the physical demands of most jobs, including travelling to work.

Guide for Grading Pulmonary Impairment According to Percentage of Predicted Spirometry:

	Normal	**Mildly Impaired**	**Moderately Impaired**	**Severely Impaired**
FEV1	>80%	60-79%	41-59%	<40%
FVC	>80%	60-79%	51-59%	<50%
FEV1/FVC	>75%	60-74%	41-59%	<40%

c)Limitations of Spirometry grading of physiological abnormality:

- Spirometry can provide a precise and reproducible measurement of an individual’s lung function. However, it cannot be relied on to always give a correct evaluation of the full degree of an individual’s degree of cardio-respiratory fitness or impairment.
- In the event of discrepancy between an individual’s symptoms and degree of spirometry impairment; or if more information is required to evaluate fitness to perform an occupation; or to support an application for compensation benefits, more detailed lung function testing or formal exercise testing may be appropriate as an adjunct to clinical evaluation.

5.7.6.5 False positive causes of abnormal results:

Before acting on an apparently abnormal spirometry test the OMP will consider the possibility of a false positive test as the causes can be technical or biological:

a) Technical false positive results

- Causes includes incorrect entering or measurement of data such as:
  - Age, height or ambient temperature.
  - Differences in head or body positions.
  - A different or malfunctioning spirometer or person administering the test.
  - Differing amounts of effort from the person being tested.
- The FEV1 is usually underestimated because of insufficient or poorly coordinated effort in the early expiration.
- The FVC is usually underestimated because not enough time is allowed for lung emptying. This is particularly the case when airflow obstruction is present and there is a low flow rate at the end of expiration. In this instance the severity of airflow obstruction will be underestimated.

b) Biological false positive results:

The important causes of biological false positives in Spirometry differ at baseline from subsequent tests.

i. False positives on baseline testing

- Ethnic factors – it can be expected that 10 to 15% of otherwise healthy persons of African origin will record a mild abnormality when ECCS reference values are used without an ethnic correction factor, even though these individuals have no objective respiratory abnormality detectable and have normal exercise capacity. Consequently, the presence of a mild restrictive abnormality in the correct context is not a sufficient basis for considering a person unfit.
- The purpose of documenting a person's level of lung function at an initial examination is in order for any future health events to be measured against a baseline. This is the most reliable and informative manner in which to interpret spirometry and has the advantage of minimizing the problems inherent in a choice of any particular set of reference values.

ii. False positives on periodic testing

In medical surveillance using Spirometry testing the signal of interest is the contribution of occupational exposures to declining lung function. All other causes of accelerated decline in lung function can therefore be regarded as noise or false positives, for example the progressive onset of obesity will influence spirometry as would inter-current illnesses or events such as chest infections or chest trauma

5.8 Audiometry

Audiometric testing forms an integral part of the medical surveillance system and monitors the sharpness and acuity of an employee's hearing over time, whilst simultaneously providing an opportunity for employers to educate employees about their hearing and the need to protect it. Audiograms will consist of the following, aligned with the requirements of the Standard Threshold Shift (STS) in Medical Surveillance of Noise Induced Hearing Loss:

Pre-employment (Baseline Audiogram)

a) An initial audiogram prior to employment.

b) Baseline audiograms will be conducted within the period specified in regulation 11.4(4) for all new employees who has been employed after 16 November 2003 and of whom a valid baseline audiogram has not been recorded.

c) An employee’s baseline audiogram will apply for their total working career.

Periodic Audiogram

a) Periodic audiograms will be obtained at least annually for all employees working in noisy areas, as required by the MHSA.

b) In addition to the periodic audiograms, a monitoring programme may be done where employees are exposed to environments where the noise levels equal or exceed 105 dB. Such a monitoring audiogram will be conducted immediately after completing a normal shift. The purpose of such a monitoring audiogram is to determine if a temporary threshold shift has occurred and to monitor the effectiveness of the hearing conservation programme.

Exit Audiogram

a) An exit audiogram will be recorded for any employee leaving employment.

b) As far as reasonably practicable, an exit certificate will consist of the details of the baseline audiogram, most recent audiogram and percentage loss of hearing sustained (if any).

5.8.1 Standard Threshold Shift (STS) in Medical Surveillance of Noise Induced Hearing Loss

BMM-HSE-VOH-SOP-003B: Standard Threshold Shift (STS) in Medical Surveillance of Noise Induced Hearing Loss was compiled to provide the framework to assist with the implement of the STS principles in the mines’ medical surveillance system. This is to ensure that the risk of noise exposure is effectively managed.

Determining milestone baselines for all employees at risk - The following principles apply when determining milestone baselines:

a) A milestone baseline audiogram must be conducted on every *current employee* in any working place where the equivalent continuous A-weighted sound pressure level, normalised to an eight-hour day or a forty-hour working week, is equal to or exceeds 85 decibels A dB(A).

b) From 1 July 2016 a milestone baseline audiogram must be conducted within 30 days of commencement of employment on every *new employee* exposed to any working place where the equivalent continuous A-weighted sound pressure level, normalised to an eight-hour day or a forty-hour working week, is equal to or exceeds 85 decibels dB(A).

c) Milestone baselines must only be conducted if the employee was removed for at least a period of 16 hours from an environment in which the noise level was equal to or exceed 85 dB(A).

d) A milestone baseline audiogram is the better of the employee's two audiograms performed by an audiometrist on the same day and that do not differ from each other by more than 10 dB for any of the frequencies in the 2000, 3000, and 4000 hertz (Hz) test ranges in one or both ears.

e) If two audiograms do not conform to the requirements above, the employee must be referred to an audiologist to establish the milestone baseline.

f) If the audiologist cannot establish a milestone baseline as contemplated above, the audiologist may determine the milestone baseline by using other techniques, such as speech reception thresholds.

g) All subsequent audiograms conducted during medical surveillance examinations will be compared to the milestone baseline audiogram to determine if STS has occurred and if the STS is reportable.

h) An employee’s milestone baseline must be recorded and kept as part of the medical surveillance records for a period of 40 years (after termination of employment).

i) The milestone baseline of an employee as conducted in terms of this guidance note will be considered as the employee’s milestone baseline for purposes of reporting on the Milestones for the duration of their total working career at that specific employer, or until a reportable level is reached.

j) When a reportable level is reached, the audiogram conducted at that time becomes the new milestone baseline for the purposes of future monitoring.

Monitoring for standard threshold shift from the milestone baseline

NOTE: The application of measuring STS as a leading indicator is to identify at risk employees who are of sustaining permanent hearing loss and to report on progress made towards the milestones.

During medical surveillance examinations, the audiogram of employees who are at risk must be evaluated to determine:

a) If a STS has occurred; and

b) Whether the STS is reportable.

c) Once a reportable STS has been determined; the audiologist and the OMP must inform the employee of the STS and the implications thereof.

d) Counsel the employee on the danger of exposure to noise in the work environment and the hearing protection measures.

e) Advise the employer to take appropriate management measures to prevent permanent hearing loss to this employee at risk.

THE PROCESS FOR MEASUREMENT AND MANAGEMENT OF STS

The process of measuring and managing the **STS** should be addressed as follows:

Step 1:

a) Determine if the employee's results indicate an **STS** as compared to the **milestone baseline**, i.e. is there an average change in hearing of 10 dB or more at the frequencies of 2000, 3000 and 4000Hz in one or both ears?

- If 'No', stop process **-** no further management required.
- If 'Yes', proceed to step 2

Step 2:

a) Determine if there is a significant average shift on the employee's current audiogram test, i.e. the average change in hearing from the baseline '**audiometric zero**' (the **milestone baseline STS**), is 25dB hearing loss or greater at the same frequencies in the same ear?

b) If 'No', stop process **-** no further management required.

c) If 'Yes', proceed to step 3.

Step 3:

Determine whether the hearing loss is work-related, i.e. if the employee is exposed to significant noise levels in the work environment?

a) If 'No', counsel the employee on the danger of exposure to noise outside of the work environment.

b) If ‘Yes’, counsel the employee on the danger of exposure to noise in the work environment;

c) Advise the employer to take appropriate management measures to prevent permanent hearing loss in employees who are occupationally exposed to significant noise levels, i.e. apply the hierarchy of controls to limit exposure to significant levels of noise in the work environment; and

d) Report the hearing loss to the employer in terms of the 2014 **MHSC** Summit milestones.

REPORTING MILESTONES STS CASES

Reporting should be done in line with the **MHSC** Milestones Reporting requirements.

5.8.2 Audiometric Equipment

5.8.2.1 Screening Audiometers

Audiometers used for baseline, periodic screening, monitoring and exit audiometry complies with the requirements for Type 4 accuracy specified in IEC 60645-1 and provide for testing at the audio frequencies of 500; 1000; 2000; 3000; 4000; 6000 and 8000 Hz.

5.8.2.2 Audiometric Booths

Acoustic enclosures (booths) used for screening audiometry complies with the relevant requirements stipulated in SABS 0182: 1998 “The measurement and assessment of acoustic environments for audiometric tests”. In addition, the room in which audiometric screening takes place has also been “soundproofed”.

5.8.3 Audiometer Calibration & Verification Checks

5.8.3.1 Annual Objective or Electro-Acoustic Calibration

a) All newly commissioned screening audiometers will have a valid calibration certificate.

b) Audiometers “in-use” will be electro-acoustically calibrated on an annual basis.

c)Calibrations will be in accordance with the procedures stipulated in SABS 0154-1: 1996.

d) All calibration certificates will be retained for record-keeping and inspection purposes, as well as for validation of audiometric test results in cases of dispute.

e) Electro-acoustic calibration procedures will be performed by a service provider who has the necessary training and equipment, and can demonstrate traceability to the National acoustics standard, in accordance with the Measuring Units and National Standards Act (Act 76 of 1973), as amended by the Measuring Units and National Measuring Standards Amendment Act (Act 24 of 1998).

5.8.3.2 Weekly Calibration & Inspections

The following is conducted on a weekly basis:

a) Inspection of all cables, connections and headphones.

b) Confirm proper function of the subject response button.

c)A calibration verification of equipment with a calibrated acoustic tester. Should the calibration check fail, the equipment will be checked to ascertain if it can be corrected. If corrected, another acoustic test will be conducted to ensure correct operation. Should continue to fail the accredited service provider will be contacted to rectify.

d) Records of inspections and calibration checks are kept, with proof of calibration of the acoustic tester by an accredited service provider.

5.8.3.3 Daily Inspections

Each day, prior to audiometric testing, the audiometrist will conduct the following inspections:

a) Inspect all cables, connections and headphones.

b) Confirm proper function of the subject response button.

c)Cleanliness of equipment.

d) Should damage to equipment be evident, the equipment will be replaced if spare equipment is available or withdrawn from service until repaired.

e) Records of inspections are kept.

5.8.4 Personnel Performing Audiometry / Providing Medical Opinions

The minimum qualifications of persons performing the various types of audiometry and providing medical opinions are stated below:

5.8.4.1 Baseline, Periodic Screening, Monitoring and Exit Audiometry

a) An audiologist

b) A medical specialist

c)An occupational medical practitioner

d) An audiometrist

5.8.4.2 Diagnostic Audiometry

a) An audiologist

b) A medical specialist (in otorhinolaryngology)

5.8.4.3 Medical Opinion

a) In complex cases or when a patient's disability is expected to be more than 30%, the medical opinion of a medical specialist / ENT specialist will be obtained.

b) In all other instances where the hearing loss is adjudged to be noise-related, the medical opinion, in the first instance, shall be that of an occupational medical practitioner.

5.8.5 Registration

5.8.5.1 Audiometrist

a) Individuals performing baseline, periodic, monitoring and exit audiograms will be registered as an audiometrist with the appropriate authority, e.g. Audiometric Registrar.

5.8.5.2 Audiometric Testing Service Providers

a) The audiometric testing service will be registered with the relevant Controlling Authority.

b) The returns required will be submitted to the relevant Controlling Authority to ensure that required standards are adhered to, that required procedures are applied, and that the required calibration status of audiometric equipment is maintained.

c)The relevant Controlling Authority can randomly audit the audiometric testing service provider.

5.8.5.3 Audiometer Calibration Service Providers

a) Only individuals / organizations registered with the relevant Controlling Authority will be used for calibration of audiometric equipment.

b) Proof of such registration and the required returns by the calibration service provider to the relevant Controlling Authority will be kept on file at the clinic.

c)The relevant Controlling Authority can randomly audit the audiometric calibration service provider.

5.8.6 Quality Control Checks for Audiometric Testing Facilities

The following quality control checks will be performed by personnel performing audiometry on the audiometric test facility's equipment or environment to ensure it does not have a negative impact on the accuracy of audiometric evaluations.

5.8.6.1 Acoustic Enclosures, Cabling, Connections & Earphones

Proper function will be checked daily and corrective action taken immediate where necessary:

a) Acoustic seals on doors

b) Ventilation and lighting systems in the test booths / soundproof room

c)Electrical mains cables and connections

d) Acoustic cables and connections

e) Earphone headbands (for proper tension)

f) Earphone cushions (for damage, resilience/acoustic seal, cleanliness and hygiene)

g) Subject response button

5.8.6.2 Background Noise

a) Subjective checks on a daily basis will be performed to confirm that noise levels inside the test booths / soundproof room are sufficiently low to prevent masking or other interference with audiometric testing, and corrective action taken immediate where necessary.

5.8.6.3 Distractions

a) It will be ensured that test subjects are comfortable and if possible, that visual contact is maintained between the audiometrist and the test subject. No undue stress will be placed on the subject by environmental distractions, e.g. visible/audible distractions or thermal discomfort.

5.8.7 Otoscopic Examinations

a) Prior to audiometric testing the test subject will undergo an otoscopic examination to ascertain the presence of any excessive earwax (cerumen) or pathology involving the ear canal, tympanic membrane or middle ear that could adversely influence that accuracy of test results.

b) Where earwax is found in the ear canal, it will be removed by appropriate means. In case of baseline or diagnostic audiometry, the patient will be allowed to recover for three days prior to testing, in order to ensure accuracy of test results.

c) Subjects found to be suffering from infections, discharge or similar problems will be referred for medical opinion and appropriate treatment, prior to audiometric testing.

5.8.8 Conditioning Test Subjects

Depending on the purpose and type of audiometric testing, certain measures, which are documented in the audiometric records, are put in place to condition the subject.

5.8.8.1 Baseline, Periodic Screening and Exit Audiometry

a) This will be preceded by a period of at least 16 hours during which the test subject has had no exposure to noise levels in excess of 85 dB(A), to ensure that the hearing threshold levels (HTL) recorded are not influenced by temporary shifts in threshold.

b) In the case of periodic screening audiometry, but **not** in the case of baseline or exit audiometry, the use of hearing protection devices during the 16-hour pre-audiometry period is deemed to satisfy this requirement, provided that such hearing protectors comply with the minimum attenuation requirements of SABS 1451 (Part I, II or III as appropriate).

c)Measures applied to limit the pre-audiometry exposure to noise will be documented in the individual’s test record.

5.8.8.2 Monitoring Audiometry

a) No pre-test conditioning of subjects is necessary for monitoring audiometry as tests should be conducted immediately after exposure to noise. The purpose of this form of increased surveillance is the early identification of any temporary threshold shifts (TTS). Where results indicate the possible occurrence of TTS, a re-evaluation of the suitability of an individual’s HPD’s and his/her application there-of (including training and motivation) will be done.

5.8.8.3 Diagnostic Audiometry

a) This will be preceded by a period of at least 16 hours during which the patient is not exposed to noise levels that exceeds 85 dB(A). The wearing of HPD’s during this period **does not** satisfy this requirement.

b) Measures applied to satisfy this requirement will be documented in the individual’s test record.

5.8.9 Acquisition & Recording of Subject-related Information

The individual’s service and medical records will be at hand, including the findings of pre-audiometric otoscopy, the risk-based medical examination and measures taken to ensure that the subject is appropriately conditioned for audiometric testing. The following steps will then be taken:

a) A new record sheet / data capture field will be completed. Computer-based record-keeping systems must make adequate provision to ensure that data are not lost as a result of computer failure, or any changes in hardware or software.

b) Record any pertinent information, including the results of noise exposure determinations for the individual or his/her occupation/workplace.

c) Question the test subject regarding general health, use of medication, ear infections or complaints, cold, etc. and record all relevant information.

d) Ascertain whether either ear is better than the other, e.g. by reference to previous test results or the individual's stated preference for one ear when using a telephone, etc. and where one ear is better, test that ear first.

e) Note any pertinent information regarding abnormalities or deviations found during the otoscopic or risk-based medical examinations.

5.8.10 Instruction of Test Subjects

Adequate instruction of the test subject is critical for the accurate assessment of hearing threshold levels. Where possible, the subject will be instructed in his/her own language with regard to:

a) How to respond when a sound is heard, i.e. the pressing and releasing of the response button.

b) The importance of responding as soon as a sound is heard.

c) The requirement to respond to any signal heard, regardless of how faint it may sound.

d) The importance of not adjusting or tampering with the earphones.

e) The need to refrain from causing any noise by moving about, fidgeting or talking.

f) How to disrupt the test in the event of any disturbance or discomfort.

Ensure that the test subject has understood the instructions and where there is any uncertainty in this regard, repeat the instructions.

5.8.11 Final Preparation for Test Subjects

Before proceeding with the audiometric testing, the following steps must be taken:

a) Ask the subject to remove any earrings, hearing aids, spectacles, headwear, etc.

b) Ensure long hair is moved away from the ears, to prevent any interference with the acoustic seal between the earphone cushions and ears.

c) Earphones should be fitted by the audiometrist.

d) Ensure that the test subject is comfortable and has no unanswered questions or concerns regarding the test procedure.

e) Ensure that there is adequate lighting and ventilation in the test booth/soundproof room.

f) Close the door to the test booth and confirm it seals properly.

5.8.12 Familiarisation Phase

Before commencing with the audiometric testing, the audiometrist will ensure the test subject is familiar with the procedure and understands how to respond appropriately (computerised audiometry): Set the audiometer to the first test frequency and observe the subject's response for 20 to 30 seconds to determine if the subject has understood the instructions. If this is not the case, the instructions should be repeated and be followed by a second practice run. If the subject shows consistent responses, the test phase can begin.

5.8.13 Test Phase

During the test phase, the subject's hearing threshold levels are determined for each test frequency for both ears. The audiogram is saved on completion.

5.8.14 Actions to be taken based on Audiometric Test Results

5.8.14.1 Baseline Audiograms

a) The better of the two audiograms recorded (i.e. that indicating lower hearing threshold levels) shall be regarded as the individual's baseline audiogram, provided that the two audiograms do not differ by more than 10 dB at the test frequencies of 0.5; 1; 2; 3 or 4 kHz. Where this provision is not met, additional audiograms shall be recorded until two audiograms with corresponding results that are within 10 dB have been obtained.

b) The individual's percentage loss of hearing (PLH) shall be derived from the baseline audiogram, using the approved frequency-specific tables (as is specified in the Guideline for Noise – Annexure A).

c)The baseline audiogram and PLH derived shall be entered in employees' medical surveillance records and maintained in accordance with legal requirements (MHSA, Act 15(1) & (2)).

5.8.14.2 Periodic Screening Audiograms

a) The employee's PLH shall be derived from the periodic screening audiogram using the approved frequency-specific tables (as is specified in the Guideline for Noise – Annexure A) and compared with the PLH derived from the baseline audiogram. Where the periodic screening audiogram indicates an increase in PLH of 10 % or greater relative to the baseline audiogram and this is confirmed by repeat audiometry, the individual shall be referred for diagnostic audiometry.

b) Where the periodic screening audiogram indicates an increase in hearing threshold level (HTL) of 15 dB or greater at any of the audio frequencies of 3; 4 or 6 kHz relative to the baseline audiogram and this is confirmed by repeat audiometry (performed only after re-instruction of the employee in the audiometric procedure and refitting of earphones by the audiometrist), the following procedure shall be applied:

- The findings shall be explained to the employee
- The employee shall be referred for retraining and re-instruction
- The suitability of the hearing protection provided shall be re-assessed

c)The periodic screening audiogram, the PLH derived from it, and any increase in PLH &/or HTL at 3; 4 or 6 kHz relative to the baseline audiogram shall be entered in the employee's record of medical surveillance and maintained as per legal requirements.

5.8.14.3 Monitoring Audiograms

a) Where the monitoring audiogram indicates an increase in HTL in either ear that equals or exceeds 15 dB at any of the audio frequencies of 0.5; 1; 2; 3; 4; 6 or 8 kHz relative to the baseline audiogram, a repeat audiogram shall be performed immediately, but only after re-instruction of the employee in the audiometric procedure and fitting of earphones by the audiometrist.

b) Where the repeat audiogram confirms any increase in HTL of 15 dB or more at the frequency and in the same ear that was indicated by the initial monitoring audiogram, the following procedure shall be applied:

- The findings shall be explained to the employee
- The employee shall be referred for retraining and re-instruction
- The suitability of the hearing protection provided shall be re-assessed

c)The monitoring audiogram and any increase in HTL indicated by it may be entered in the employee's record of medical surveillance, and periodic screening audiometry may be applied to determine the extent of permanent threshold shifts.

5.8.14.4 Exit Audiograms

a) The individual's PLH will be derived from the exit audiogram using the approved frequency tables (as is specified in the Guideline for Noise – Annexure A) and compared with the PLH derived from the baseline audiogram.

b) Where the exit audiogram indicates an increase in PLH of 10% or greater relative to the baseline audiogram and this is confirmed by repeat audiometry, the individual shall be referred for diagnostic audiometry.

c)Where the individual is referred for diagnostic audiometry as contemplated in the preceding point, the audiogram, the PLH derived from it and any increase in PLH relative to the baseline audiogram shall be entered in the individual's medical surveillance record [MHSA, Act 17(4)(b)].

d) The exit audiogram and PLH derived from it shall be recorded on the individual's exit certificate [MHSA, Act 17(1)-(4)], and a copy of the exit certificate shall be entered in the individual's record of medical surveillance [MHSA, Act 17(4)(b)].

5.8.15 Diagnostic Audiometry

The medical opinion of the OMP is required before referral for diagnostic audiometry:

a) Diagnostic audiometry will be performed by either an audiologist or a medical specialist. The subject must not have been exposed to noise levels in excess of 85 dB(A) during the 16 hours immediately preceding the diagnostic evaluation, a requirement that **cannot** be met through the use of HPD's.

b) Diagnostic evaluations will include pure-tone air conduction, as well as bone conduction audiometry. Additional techniques such as narrow-band or speech discrimination audiometry may also be used where indicated.

c) Two diagnostic audiograms will be recorded during two different sittings, which may take place on the same day. If the two audiograms differ by more than 10 dB for either ear at any of the mandatory test frequencies, a third audiogram will be conducted during a third sitting to obtain consistent results. Should the third sitting also indicates inconsistencies greater than 10 dB, the subject will be re-evaluated in 6 months. Where consistent audiograms are not obtained, even after 6 months, the subject will be referred to for specialist evaluation to assess hearing loss.

d) The audiologist or medical specialist performing the diagnostic audiometry must refer to provisions in the Compensation Commissioner’s Internal Instruction, “The determination of Disability in Cases of Noise-Induced Hearing Loss”.

5.8.16 Information to be Recorded

5.8.16.1 Periodic Screening Audiograms

Information to be recorded or be apparent in the periodic screening audiometry records:

a) The individual’s name, identity number, company or work identification number and age.
b) Nature of the individual’s work and date of employment.
c) Details of observed noise levels and noise exposure levels relevant to the individual or to his/her occupation or workplace, including such levels relevant to previous allocations, and the period worked in each occupation or workplace.
d) Name, address, qualifications and registration number of the person conducting audiometry.
e) Relevant medical details, e.g. the individual’s use of medicines, occurrence of colds, allergies, wax in ear canal, etc.
f) The individual’s baseline audiometric data and PLH derived from them.
g) The individual’s current threshold hearing levels and PLH derived from them.
h) Relevant comments regarding the individual’s response to testing.
i) Details of any differences found between the baseline and current audiograms.
j) Details of any actions taken.
k) Copies of any medical opinions obtained, and the names and addresses of the individuals providing such medical opinions.

All records will be maintained in accordance with legal requirements [MHSA 15(1) & (2)], and adequate provision will be made that data is not lost as a result of computer failure or changes in hardware or software of computer-based systems.

5.8.16.2 Diagnostic Audiograms

The following information will be recorded or be apparent in the records of periodic screening audiometry:

a) The individual’s name, identity number, company or work identification number and age.

b) An indication of the positive identification of the individual by means of an identity document, ID card or similar document bearing a photograph.

c) Name, address, qualifications and registration number of the audiologist or medical specialist conducting audiometry.

d) Observed hearing threshold levels for pure-tone air and bone conduction audiometry at all frequencies required for diagnostic audiometry, and values for PLH respectively derived from these HTL's.

e) Observed hearing threshold levels for speech discrimination &/or any other audiometric techniques, as applicable.

f) Relevant comments regarding the individual's response to testing.

g) Comments regarding the current test result's consistency with previous results.

h) A report on the evaluation's findings, i.e. a specific assessment regarding the possibility of a causal relationship between any abnormalities identified and occupational (or other) noise exposure, or of a link with any other causes.

i) Signature of the audiologist or medical specialist conducting the evaluation

5.9 Biological Monitoring

5.9.1 Blood Lead Monitoring

Monitoring of blood lead levels is done by collecting a venous blood sample and analysed with the on-site blood lead analyser. In the event that the level exceeds the BMM action level it will be submitted to an approved laboratory for confirmation analysis. For additional detail please consult BMS 105 Blood Lead Procedure and BMF 144 Blood Lead Questionnaire A & B. The table below depicts the minimum monitoring frequencies based on gender, work location and occupation:

BLOOD LEAD MONITORING (Refer to VOH-STD-105 for details on Blood Lead Monitoring)		
FREQUENCY	**WHOM**	**FUNCTION**
Annual	All employees	• Part of periodic medical surveillance
	Males:	• Below the action limit (30ųg/dl)
	Females:	• Females not capable of procreation (action & withdrawal levels as for females capable of procreation)
3-monthly	Females:	• Capable of procreation below the action limit (10ųg/dl)
	All newly appointed employees during the first year of employment (even if blood lead levels are below the BMM standards)	
Monthly	Males:	At or above the action limit (30ųg/dl)
	Females:	• At or above the action limit (10ųg/dl) • Pregnant and breastfeeding
Discretion of OMP	Males:	• At or above the withdrawal limit (35ųg/dl)
	Females:	• At or above the withdrawal limit (15ųg/dl)
Note: Blood lead monitoring will also be done during pre-employment medical and exit medical		

5.9.2 Urinalysis

The following tests / screenings are done:

a) Urinalysis is done using Bayer "Multistix 10"

b) Origins of haematuria, proteinuria and glycosuria are established and assessed as required by the COP for Thermal Stress.

c) Multi-drug screening

d) Diabetes

5.9.3 Liver Function

Blood for liver function testing, etc.

5.9.4 Chemical Substances

Although certain parts of the medical surveillance system already cater for the medical surveillance of chemical substances, the following will be taken into account:

a) MSDS data as supplied by the relevant OEM

b) Occupation & exposure to the substance

c) Gender

5.10 X-Rays

Chest x-rays (35x43cm or 35x35cm) are taken at intervals as determined through the risks associated with the working area &/or occupation, as well as an individual's physical condition.

Chest x-rays will:

a) Be off a suitable quality for proper classification of pneumoconiosis and in accordance with ILO 1980 which refers to radiological classification.

b) Show the date of the x-ray and name & birth date of the individual.

Calibration / Checks:

a) X-ray equipment: on an annual basis by an approved / competent service provider.

b) All equipment will be inspected at intervals as required by the equipment manufacturer

5.11 Tuberculosis

Tuberculosis management is as per the Management & Control of Tuberculosis Standard Operating Procedure, which includes the requirements of the Guidance Note for the Management and Control Programme for Tuberculosis in the SAMI (DMR 16/3/2/3-A8) and the Guidance Note for the Management of Latent Tuberculosis Infections in the SAMI (DMRE 16/3/2/3-B5).

5.12 Job Placement Evaluation

The placement of individuals in the respective work areas &/or occupations are done as per "SS 0003 Guideline for Job Placement Guide", which considers the latest medical surveillance results of the individual, the occupational health risks associated with the work area &/or occupation and in the case of females if she is pregnant or breast feeding.

Based on these criteria, a person could temporarily or permanently be excluded from certain work areas &/or occupations for health reasons. Should this occur, the relevant Black Mountain Mining Policies, Procedures and Standards will be followed

5.13 Medical Evaluation

The OMP will evaluate the findings of each individual to determine if a person is "fit to perform work at the mine". Final discretion of 'fit to work' will be with the OMP.

Criteria to be followed when abnormalities are observed:

a) Renewal:

- Frequency of medical surveillance might be increased.
- The persons COF may be temporarily suspended until such time that the condition has returned to normal / can be rectified.
- The person's COF might be revoked.

b) Pre-employment:

- No certificate of fitness may be issued if determined by the OMP based on required minimum criteria.

5.14 Health Inspections & Incident Investigations

a) The OMP or his designate will endeavour to conduct a minimum of twelve workplace health inspections during a calendar year as part of the periodic review of hazards identified and risks assessed to determine whether further elimination, control and minimization of risk is possible. A report of such inspections will be compiled and kept on record at the Occupational Health Clinic.

b) Health Incidents will be investigated in terms of Section 11(5) of the MHSA and reported on the applicable DMR report form. The OMP or his designate will also form part of the investigation team into serious illness and health-threatening occurrence

5.15 Record Keeping

Occupational medical records will be kept as follows:

a) Stored in a strong room

b) Confidential as per applicable legislation

c) Stored for 40 years from the last date of medical surveillance for each employee

d) Stored at a designated storage facility in the event that the mine closes

6. Competencies

Competencies of the on-site Occupational Medical Personnel will be as follows:

a) Occupational Medical Practitioner: a MB ChB and Post Graduate Diploma in Occupational Medicine and registered as a General Medical Practitioner with the HPCSA.

b) Occupational Nursing Practitioner: Diploma in Occupational Health with annual registration with SANC.

c) Audiometrist: Individuals performing baseline, periodic, monitoring and exit audiograms registered as an audiometrist with the appropriate authority, e.g. Department of Labour.

d) X-rays: Radiographer: appropriate qualification and annual registration with HPCSA as a Radiographer.

Competencies of off-site medical personnel / facilities will be as follows:

a) Audiologist: registered with the Health Professional Council of South Africa as an OMP, certificate in audiometry issued by an institution recognized and approved by the Dept. of Labour (as relevant).

7. Validity and Document Management

7.1 Document Validity

This SOP is effective from 2011/07/12 and was last reviewed on 11-11-2024. This SOP will be reviewed every 2 Years.

7.2 Document Management

7.2.1 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.

7.2.2 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.

7.2.3 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.

7.2.4 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.

7.2.5 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.

7.2.6 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.

7.3 Violation of SOP

7.3.1 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.

7.3.2 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.

7.3.3 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.

7.4 Disclaimer

7.4.1 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.

7.4.2 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.

8. 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: **Approved**

Approvals were done electronically.

❖ Annexures / Appendix