REPUBLIC OF RWANDA

RWANDA MINES, PETROLEUM AND GAS BOARD

MINING SAFETY STANDARDS

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INTRODUCTION

The Mining safety standards or code of practice shall apply to all mining related work including the open pits, underground mines and tunnels mining. The linked surface operations like the processing facilities and others required for the operation of the mine are also covered in this code of practice

The objective is to provide a best practice guide for the management of health and safety in mining and in particular the underground mining environment and the open pit mines. The mining Safety Standards will provide a framework for the management of the hazards and associated risks that are inherent in the sector.

It is expressly noted that the Mining Safety Standards does not replace or over-ride the provisions of the Law on Mining and Quarry Operations no 13/2014 of 20/05/2014 and/or its Regulations. In case of conflict in the interpretation the Law on Mining and Quarry Operations no 13/2014 of 20/05/2014 shall prevail. The Standards are intended to be used in conjunction with other DEPARTMENT guidelines and regulations.

INTERPRETATION

In the standards unless the context otherwise requires interpretation;

"Law" shall mean the LAW N° 13/2014 OF 20/05/2014 on mining and quarry operations

"Employer" shall mean the company or cooperative responsible that employs workers at the mining site

"Environmental Impact study" document comprising environmental engagements of the holder of a licence of exploitation such as defined in the specific Environmental Regulations for the mining activity

"Mine Operator" Shall mean the representative of the holder of the exploitation license who could be the Director, Managing Director or Chief Executive Officer of the license holder

"Minerals Industry" means all companies and co-operatives engaged in exploration and extraction of minerals including metallic minerals, industrial minerals, non-metallic minerals, sand aggregate and gravel and clay.

"Hazard identification" means the process of recognizing that a hazard exists and defining its characteristics.

"Hazard" means a source or a situation with a potential for harm in terms of human injury, ill-health, damage to property, damage to the environment, or a combination of these.

"Harm" that does not usually occur, or usually is not easily detectable, until a significant time after exposure to the hazard.

Holder" means the institution in whose name a mining right is registered.

"Mine" means any place, pit, shaft, drive, level or other excavation, and any drift, gutter, lead, vein, lode, reef, saltpan or working, in or on or by means of which any operation connected with mining is carried on, together with all buildings, premises, erections and appliances, whether above or below the ground, that are used in connection with any such operation or for the extraction, treatment or preparation of any mineral or for the purpose of dressing mineral ores.

"Adit" means a horizontal or nearly horizontal tunnel driven from the surface for the working of a mine

"Mineral" means any material substance, whether in solid, liquid, or gaseous form, that occurs naturally in or beneath the surface of the earth, but does not include water, petroleum or any substance or thing prescribed by regulation.

"Mining" means the extraction of material, whether solid, liquid or gaseous from land or from beneath the surface of the earth in order to win minerals, and includes any operations directly or indirectly necessary or incidental thereto.

"Mining area" means an area of land subject to a mineral licence granted under the Law.

"Mining operations" means operations carried out in the course of mining.

"Mining plant" means any building, plant, machinery equipment, tools or other property that has been used for mining, whether or not affixed to land, but does not include any timber or other material used or applied in the construction or support of any shaft, drive, gallery, terrace, race, dam or other work.

"Mineral licence means a mining licence, quarry licence or an exploration licence, granted under the Law.

"Risk" means the combination of the likelihood and consequences of a specified hazardous event occurring.

"Risk assessment" means the overall process of estimating the magnitude of risk and deciding whether or not the risk is tolerable or acceptable

"Abandoned place" means any place where work has ceased and through which persons no longer travel;

"Barricade" means a structure designed to prevent the entry of persons to an area;

"Competent person" A person having the knowledge, experience, skill, and qualifications to carry out a particular task of supervision, drilling, blasting, plumbing, mining, electrical, civil and mechanical technician in mining as deemed as adequate by the Department upon assessment.

The qualifications and experience for competent persons will be set by Department

"Machinery" means every kind of electrical and mechanical apparatus

"Incident" Unplanned event which results in damage or production lost but does not result in harm.

"Inspector" means the Inspector of mines appointed under the Regulations and Inspection Unit of the Geology and Mining Department

"Quarry" means any working open to the surface beneath the original surface for the purpose of extracting building or industrial minerals;

"Department" shall mean the Government institution responsible for implementing the mining laws and regulations, and standards

"Accident" means any unplanned event which results in harm.

"Near Miss/potential incident" shall mean an unplanned event, which under slightly different circumstances, could have resulted in an incident/accident

"Ladder way" means that part of any shaft, or raise where permanent ladders are installed for the use of persons travelling;

"Ladder" includes a step ladder, a chain ladder, and extension ladder

"Employer" any physical or moral, public or private person that employs one or several workers, even in a discontinuous way;

"Worker" any person who commits him/herself to put his/her professional activity in return for payment under the direction and authority of another physical or moral, public or private person and will include employees, sub-contractors and artisanal miners

"Inspector of Labour" shall mean a person appointed as Inspector of Labour under the Labour Law

Labour Law shall mean Law N° 13/2009 of 27/05/2009 Law regulating labour in Rwanda

"Employers' professional organization" means an association of employers executing similar or related professions with the exclusive purpose of studying and defending their economic, and social interests;

"Workplace" places where workers carry out their services. Where an employer carries out or directs two or several operations that are independent due to their size or mission each of these operations constitutes a separate workplace. A workplace may also be a place

where one travels to or where the worker performs his/her functions while on mission.

Mining Area – A part of or whole mine where excavation operations are taking place or have taken previously

Mineral Processing Area – a part or whole mine designated for processing of minerals

"Child" any human being below the age of eighteen (18) years;

"Trade union : an association of workers executing similar or related professions with the exclusive purpose of studying and defending their economic, and social interests;

1.0 RESPONSIBILITY IN MINES

	STANDARD	GUIDELINES
1.1	**Role Of Mine Operator As A License Holder**	a. Notify the Department of the plan of operation before commencement of work b. To take all practicable measures to ensure the safety and health of employees while at work c. Ensure that machinery and equipment in the place of work is designed, made, set up, and maintained to be safe for employees d. Develop and implement the Health Safety and Environment Policy at place of work e. Develop policies and standard operating procedures for containment of hazards and for dealing with emergencies that may arise while employees f. Provide correct Personal Protective Equipment to employees g. To inform all their employees about the following i) Emergency procedures; ii) Hazards the employee may be exposed to during work

		iii) Hazards the employee may create while at work which could harm other people; iii) How to minimize the likelihood of these hazards becoming a source of harm to others h. The location of safety equipment and how to use and maintain it i. Provide reports to various Government institutions as per Mining law and regulations j. Provide working insurance to all mine workers with a minimum prime of a net compensation of not less than 2Millions for permanent disabled injury and not less than 1.5Million net compensation for the deceased worker after covering other costs related k. Display important numbers of Police, GMD, Inspectors, on a notification board for emergency use
1.2	**Role Of Employees**	a. Take responsibility for ensuring own and workmates health and safety while at work b. Comply with lawful instructions given by an employer or manager c. Take necessary steps to reporting hazards that as employees are unable to control individually d. Exercise the right to refuse to undertake work under any unsafe practices e. Take care of all safety equipment including PPE that has been issued f. Co-operate with relevant Government officials through providing information requesting

1.3	**Role Of Mine Inspectors**	a. Coordinate all regulation and supervision of mining development activities b. To enter, inspect and examine any mine or part of a mine at any time by day or by night c. Responsible to ensure that inspections are done in such a manner that the work at the mine is not unnecessarily disturbed by the exercise of the power in (a) d. Issue directives he may consider necessary in the interests of safety or health e. take samples for test or analysis any item or substance as he may think necessary f. Prepare and implement mining standards; g. Enforce National mine Inspection standards with ICGLR mine standards h. Conduct inquiries and investigations on mine accidents and incidents i. obtain and record statements from witnesses or conduct inquiries into accidents j. Enforce and implement mineral chain of custody regulations k. Any other role as specified
1.4	**Role Of Government Authorized Persons**	a. Government agencies represented at local Government level shall have a role of ensuring that the mining work are carried out in way that it does not contravene provisions of the laws on employees health and safety and the environment b. The Labour Inspectors and the Government officers at Local Government level have right to enter premises of operations for the purpose of monitoring the operations c. Inspectors of Labor under the Ministry of Labor shall have a right to exercise their functions provided under the Labour Law of Rwanda on all mining operations

1.5	**Role Of Trade Unions, Worker And Professional Associations**	a. In the management of health and safety, the trade unions have responsibilities as i. Increase awareness on the mining safety regulations ii. Training workers on the role of Unions and in Occupational health and safety iii. Engage the Department on OHS best practices
1.6	**Control And Direction Of Mining Operations At Mines**	a. Only a Mine Technican/Manager will be responsible for the control, supervision and direction of the mining operations at all times b. The minimum qualifications and experience of persons who can be appointed as Mine Technician/manager for mine sites should be at least have a Diploma of A1 in Mining Engineering, c. No person will perform the duties of a mine technician or manager without the written appointment by the Employer d. The Mine Manager/Technician must ensure that there are appointed competent officers at the mine such as electricians and Drillers/Blasters at the mine sites. e. The Manager/Technician shall be responsible for the safety of all persons, equipment and safe environment at the sites
1.5	**Co-Operation With The Inspectors And Government Authorized Persons**	**The Mine Operator shall** a. not obstruct an inspector or a Government official in the performance of his duties; b. not willfully delay an inspector or a Government official in the exercise of his powers; c. comply with any lawful order or direction given by an inspector or a Government official; d. Produce any account, survey, license, statement, report or document required by an inspector or a Government official e. not knowingly furnish or cause any other person to furnish an inspector or a Government official with any account, survey, statement, report or document which he knows to be false or misleading.

1.6	**Minimum age for admission to underground work in mines**	a. A Child as defined in the mining safety regulations shall not be allowed to carry out work in the mines b. Minimum employment age shall be 18 years c. Child Labour is prohibited at the mines

2.0 HAZARD IDENTIFICATION AND RISK CONTROL

	STANDARD	GUIDELINES
2.1	**Control of hazards**	a. The mine operator must identify and record hazards in the place of work whether previously existing, new or potential and regularly review these to see whether these hazards have changed and require further action b. Where an incident occurs, an employer must record it in a register of the prescribed form by Department. The employer must also investigate whether it was caused by a significant hazard c. Where the hazard is significant, the mine operator must follow these steps; i. Where practicable, the hazard must be eliminated ii. If elimination is not practicable, the hazard must be isolated iii. If it is impracticable to eliminate or isolate the hazard completely, then the employer must minimize the hazard to employees or abandon the site
2.2	**Hazard Risk assessment**	a. The mine operator must ensure that there exists an understanding of the nature and frequency of accidents within a work area as a means to assist with the identification of actual or potential hazards in a workplace. b. The mine operator will keep a record of all the hazards at the mine site

2.3	**Personal Protective Equipment**	a. The mine operator will provide personal protective safety equipment (PPE) to all employees and further ensure that all people required to use the PPE do so correctly and that the maintain PPE in good condition b. Maintenance of the personal protection equipment shall be the joint responsibility of the employer and the individual employees. c. The mine operator will identify and define the replacement cycles of all protective equipment as recommended in the equipment manufacturer's guidelines as well as according to the environment in which the equipment is used. d. The use of safety helmets, overalls/work suits safety shoes/boots as personal protective equipment will be mandatory in designated areas of the mining sites. e. Hand gloves, hear protection, eye protection shall be used when there is need to do so. f. All PPE must meet the specification as set out by the Department

3.0 MAKING THE WORKING AREA SAFE

	STANDARD	GUIDELINES
3.1	**Working Place Examination for Potential Falls of Ground Checklist**	a. The Manager/Technician will appoint a responsible person who must identify all loose ground (rocks and soil), geological disturbances and take remedial action to ensure that No Ground Falls are left uncontrolled b. The checklist using the following general conditions must be carried out before start of work i. Has an early examination of the area been carried out? ii. Are all the personnel in the area able to recognize poor ground conditions? iii. Is ground condition good? iv. Is ground condition fair? v. Is ground condition poor?

3.1.2	**Tools and equipment checklist**	a. A checklist on the tools for making the working area safe must be carried out on a daily basis. i. Is there an adequate supply of pinch bars of correct lengths which have guards fitted? ii. Do personnel have appropriate PPE
3.1.3	**Condition of the Mining environment**	i. A Checklist on the prevailing environment of the mine will be conducted in the area to ensure suitable condition for men to see and/or hear signs of failing ground? ii. visibility and iii. noise levels iv. Is ventilation adequate in working area b. Checklist on the ventilation of site. Is the ventilation adequate
3.1.4	**General poor ground control measures**	a. The general control measures for poor ground upon entry to the mine shall be on the start with barring down loose rocks. b. The person barring down the loose rocks must apply the rules of barring down i.e. starting from the worse affected areas to the good areas c. If barring down blasting is not fully done, installing temporary support or barricading off the area must be carried out following the correct procedures and standard practices d. Permanent support (if any) is recommended for the area i. If the temporary support that is installed requires replacement ii. If the support is not in compliance iii. If existing support is damaged is re-support being carried out properly

4.0 UNDERGROUND MINE EXCAVATIONS

	STANDARD	GUIDELINES
4.1	**Access to underground mine working areas**	a. The standard mining operations cycle of Drilling, Charging, Blasting, Lashing and transportation shall be linked and carried out in a safe manner at all times b. Where no blasting is required the mining cycle of Breaking through Digging (mechanical or manual), lashing and transportation and the activities must be carried out in a safe manner c. Mine workings must be accessed through vertical shafts and/or horizontal adit drifts that meet the requirements in terms of size and secure entrance, walls and roof d. The access points shall be used for transportation of people and materials and shall at all times be maintained in safe conditions at all times. In this case; i. A log book detailing examinations carried out, condition of the access and remedies carried out will maintained at site
4.2	**Second Means of Access and Egress**	a. At every mine, a second means of egress, independent and separate from the primary access, must be planned and put in place as soon as practicable. b. The second access will serve dual purpose of ventilation and as well exit route in case of emergency evacuation c. The access will be developed in such a way that it is usable for safe evacuations as we intake/outlet of air d. The second access will be kept in a condition in which it is safe to use and is free of obstruction on the walkways e. Regular and period examinations shall be carried out of the second means of access f. A log book detailing examinations carried out, condition of the access and remedies carried out will maintained at site

4.3	**Access to working areas through Shafts**	a. The shaft shall be developed in such a manner that it serves as one of the main fresh air in-takes into the mine as well as lowering of personnel and hoisting of ore/waste through the shaft b. Ore from the mine loading areas shall be hoisted and tipped at the surface stockpiles c. Mine Manager/Technician must put in force a code of safe practice covering all work in underground and appoint a supervisor, as a responsible person to undertake the responsibility for the safe operations and maintenance of the shafts. d. Where manual labour in lifting of waste/ore is involved health consideration must be taken into effect on following i. the weight of the materials, ii. distance covered and iii. fatigue management process e. The hoisting mechanism through the shaft must be installed in such a way that it has a built in braking mechanism. f. As a requirement, examinations will be carried out at different frequencies for the shaft and the different winding equipment as per mine procedure g. A log book on the examinations of the shaft shall be maintained at the site at all times
4.1.2	**Access to working areas through Adits**	a. The adit shall serve as one of the main fresh air in-takes into the mine and for accessing the underground working by personnel as well as transportation of ore/waste

		b. Tunnels must be excavated in such a way the incline angle is not more 45 degree for safety of employees during access to development ends as well as when transporting ore and waste from the ends. Where a tunnel incline angle exceeds 45 degrees, the tunnel must be fitted with steps with ladders on foot or walk ways. c. Wherever practical, the tunnel shall be excavated at a positive gradient of +0.5 degrees to allow for water draining d. The Mine Manager/Technician must put in force a code of safe practice covering all work in Adits and a supervisor to undertake the responsibility for the safe operations and maintenance of the shafts. e. Where manual labor is involved health consideration will be taken into effect on the weight of the materials, distance covered and fatigue management process f. As a requirement, examinations will be carried out at different frequencies for the condition of the adit and transportation ways as per mine procedure g. A log book detailing examinations carried out, condition of the access and remedies carried out will maintained at site

<table>
<tr>
<td>4.2</td>
<td>Size of mine development ends (tunnels)</td>
<td>
a. Each mining site will have a standard established on the number of personnel to carry out the work underground depending on the size of the heading or end and amount of air.
b. The mine will clear define the minimum size of the main tunnels depending on the method of mining and equipment and shall be minimum 1.50 x 1.80 meters in the main drive
c. The mine must define the size of the other development drifts depending on number of men, ventilation and mining technology to be employed
d. The main development drive or tunnel must have sufficient cross-sectional area throughout to allow the free and unrestricted passage of persons on foot
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<tr>
<td>4.2.1</td>
<td>Ventilation for development ends</td>
<td>
a. The shall be established crew of pipe laying personnel who shall work under a competent person for safe laying and maintenance of ventilation pipes
b. As the development ends are worked, the pipe laying crew must ensure that pipes are extended and ready for the drilling crew in advance in order to
i. ventilate,
ii. extend compressed air to the drill face
iii. extend water lines, to the drill face.
c. The fans will be used to ventilate the development drives drill faces.
d. The recommended sizes of fans and ventilation pipes/tents will depend on the size of openings of headings
e. Typical ventilation quantities in small mine head with Fan sizes is given in Table 1
<table>
<tr><th>Fan Size</th><th>Air Quantity (Cubic metres per sec)</th><th>Where fan is used</th></tr>
<tr><td>380 mm</td><td>1.6</td><td>Small heading</td></tr>
<tr><td>405 mm</td><td>1.7</td><td>Small heading</td></tr>
<tr><td>480mm</td><td>3.3</td><td>Service drift</td></tr>
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Table 1 – Fan size and air delivery in different headings
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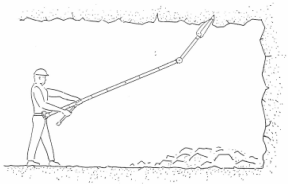
4.2.2	**Standard instructions on pipe laying for water and air.**	a. The following standards shall apply to all pipe installations:- b. Installation work shall be carried out by personnel who have received the necessary training. i) Only approved clamps shall be used during pipe installation. All clamps should be carefully examined before installation, i.e for cracking. ii) At every material crosscut an air-line of required diameter (eg 150mm) and a diameter water line of required set diameter (100mm) will be laid from the Haulage pipe line. The air-line must in all cases be carried on top and the water line below. iii) Service holes must be drilled such that every pipe is supported at each end, that is, two holes per pipe. Each will be equipped with either an appropriate eyebolt or J-hook which will be firmly anchored. The support eyebolt holes should not be less than 0.2m in depth. iv) Main air and water valves and an air pressure gauge must be installed to specifications on the pipes

4.2.3	**Preparation of a working face or end**	When working a face by mechanical means, the drilling crew members are required to collect from surface and underground stores and make the materials and equipment available at the work place. a. The following additional shall be the equipment and accessories that must be available; i. Drill bits Drill bits must be allocated to drilling crews with the required number and bit sizes ii. Grease bottles Operators and Spanner-men must be allocated grease bottles iii. Socket plugs, drill steels, charging sticks, paints, marking chalk and twine must be allocated. iv. Hand shovels, 1.8m and 3.0m pinch bars and machine man's bag containing machine accessories v. Drill machines, air-legs vi. Hand Picks b. After preparing and marking the end, the drill crew with tools shall move into position and where needed use a platform for drilling and charging. c. In case of development by non-mechanical means, the development crew will collect the tools and equipment and take the them to the working face. The equipment shall comprise the hand tools for digging, mucking and lashing

4.2.4	**Procedures on washing and cleaning at the tunnel face**	a. Ventilation must be extended to within 5m of the face ensuring the ventilation pipes are properly connected to one other and to the ventilation fan b. The hanging wall, sides and foot-wall must be washed down in order to: i. Suppress dust that is settled on the rock face and suspended in the body of air. ii. Expose cracks in the rock face for barring down. iii. Dissolve the gasses in any unlashed muck-pile. iv. Cool the working place.
4.2.5	**Standard practices for Barring down of hanging rocks**	a. The roof and side walls are barred down of any loose rocks, using a 2.0m pinch bar, minding to protect equipment and installations from loose rocks being dropped. b. Standard practices- Barring down i. Use standard length of pinch bar with sharp point and pinch, fitted with a guard as demonstrated in Figure 1 ii. Start from good ground and work towards area with bad ground. iii. Assume balanced stance with good footing for both legs, have good grip of pinch bar below the guard. iv. Maintain clear area in which to maneuver when avoiding falling and rolling rocks. v. Probe the rock face to detect loose hanging by listening out for the dull thudding of separated rock strata, and the solid sound of intact rock.. vi. Price out the loose rock with the pinched end of the bar and enlarging the cracks with the pointed end. vii. Watch the loosened and barred rock fall to settle in the muck pile. viii. Avoid standing on unstable rock pile whilst barring down. ix. Loose hanging that cannot be barred down must be blasted down or prop supported. x. Lash to expose the solid foot wall from the face to 3.0m back.

		 Fig 1- Barring Down – making work safe using pinch bar  Fig 3- Pinch bar (one Version)
4.2.6	**Procedures on washing or pumping out sockets**	a. Ensure any sockets from previous rounds are exposed for pumping and cleaning. b. Wash the drill face thoroughly well with water. c. Use an approved copper blow pipe for pumping all sockets and misfires. Two approved explosive bags must be available for keeping fuse and fracture explosives being pumped. d. The Approved Copper blow pipe i. Must be longer than the hole to be pumped. ii. Must be made of non-sparking material and must have a 90 degrees bend to allow the miner to stand clear from the direction of the hole being pumped

4.2.7	**Standard Practices for Marking the heading/face for drilling.**	a. Hang the back line peg (BLP) and front line peg (FLP) chains on the appropriate survey pegs positions in the Hanging wall. Check the length of the chains from bottom of spud to bottom of survey plates on the chains. b. Secure mason lines on the side line pegs, each crossing the haulage from one side line peg to the other peg. Ensure the mason lines are taut and horizontal. c. One man sights through the survey chains, instructing the helper at the face to mark three reference points with a paint brush on the face. d. Sight through the mason lines, instructing the helper at the face to mark three reference points horizontally across the face. One mark about the centre of the face, and one on either side about 1.0m from the side walls. e. Connect the three reference marks down the face with a continuous line 5cm in width, from hanging wall to footwall, forming a direction line. f. Connect the three horizontal reference marks in similar manner, forming a grade line. Paint the grade line backward to connect to the permanent one on either side.
4.2.8	**Determining and marking of the center line**	a. Grade and centre lines shall be painted continuously during the development phase of the heading. b. From the FLP read the offset dimensions. Add the right and left offsets, and divide the sum by two. The difference between this and each of the offsets will indicate the position of the centre line from the direction line on either left or right. c. Mark the reference points for the centre line from the direction line. Paint the centre line down the face to the footwall. Continue painting the centre line and backwards to connect to the permanent one.

4.2.9	**Procedures on marking of drill holes**	a. Drill holes will be marked according to the drilling patterns at the mine. Wax chalk or paint is used to make marks that will be visible and last the period of the drilling cycle b. Mark the Machineman's Jumper Direction Lines and mark the drill holes and Pilot hole positions following the appropriate drill pattern c. *For Example* Select a 0.2m x 0.2m x .02m space on the face, for the cut. Mark the holes as follows. i. Five hole Burn-cut Mark a centre hole to the stub, relief or void hole. Mark four holes around the centre. ii. First easers Mark four holes one on each side of the cut square, 0.3m measured from the centre of the line joining the two holes on each side. iii. Second easers Four holes, each marked 0.4m from the centre of the line joining each pair of the first easers making and side of the easers square iv. Perimeter holes Top holes - marked 0.1m below the hangingwall line and at 0.6m intervals. Side holes - marked 0.1m inward from the sidewall limiting line, on left and right, at 0.6m intervals. v. Lifter holes - marked 0.1m above footwall limiting line at 0.6m intervals. vi. Extra holes Because of the presence of sockets on the face, extra holes may be required in the space where intended hole directions may leave toe burdens not more than 0.6m

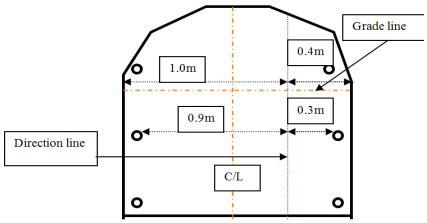


Fig 4 -Across section view of machine men direction lines in a straight end

4.2.10 **Number of blast hole in hard rock mined underground.**

Table 2: Average number of blast holes common in underground hard rock mining

Size	Total number of blast holes
1.2 x 1.2m	12
1.5 x 1.5m	16
1.8 x 1.8m	18
2.4 x 2.4m	19

4.3 **Standard on Drilling Activity of the ends**

a. Rig up drilling equipment

b. All connections on hoses must be done with hose menders and steel gauge wire. No copper wire must be used at any connections. Hose connections must be adequately bridged.

c. Check attachments of reducers, grease bottles, spuds and tail pieces to be firmly fastened.

d. The compressed air tap is closed off while connections to the Jack hammer drill machine are made.

e. When connections are completed open compressed air tap fully to ensure adequate operating pressures

f. Open the water tap adjusting to a low pressure not to cut supply to machine when not drilling.

g. Check control valve fixture and quick release valve for sound operation.

h. Fix bits onto the drill rods

4.4	**Lashing of Development ends or faces**	a. Manual and Mechanical Lashing of development ends involving the removal of broken rock after a primary or secondary development end has been drilled and blasted. must be carried out under safe procedures. b. Prepare the equipment depending on the method to be used. during Mechanical lashing- the equipment may include the loaders, battery loco and cars etc. For example, ensure a battery locomotive is adequately charged, check tip installation for safety and orderliness and other equipment pre checks. c. During Manual or Hand Lashing which will be undertaken by men using tools as hand shovels and wheelbarrows, i. ensure that the rock/soil piles are made wet thoroughly and frequently. ii. Maintain a sloping muck-pile by working it from the top, to avoid accidents from rolling rocks. iii. Ensure that the ground is Lashed down to solid footwall, exposing any lifters and plugging them **In both cases,** a. inspect the walls of the tunnel, and installations for blasting effects and stability must be checked b. Rectify unsafe conditions. Loose rocks must be attended to immediately. c. Extend ventilation to at least 5.0m from the face. d. Scale/bar down loose rocks. e. Wash down the tunnel walls, face and muck-pile in order to suppress ,dust and dissolve any gasses. f. Search for misfires on the tunnel face. If any misfires are observed manage by plugging with socket plug.. Circle misfired hole with chalk/paint and write M/F clearly

4.5	**Housekeeping during development of ends and end of shift procedure**	a. Close water taps, coil hoses and store in cross-cuts. Leave fans and air hoses ventilating ends at appropriate discharges . b. Lash and clean around unit areas and leave drains open, water control in good condition. c. Return tools to stores or areas borrowed d. Leave prop supports, timber packs or other support in place and orderly. e. Clean all platforms of rock debris f. Defects in equipment are communicated and recorded g. Crew cards are marked and all work record sheets signed
4.6	**Mining of two approaching development end or tunnels**	a. When a tunnel is being developed towards another working tunnel and the distance between the two tunnels is **10m**, the following must be ensured i. Only one end must be developed at a time ii. The stopped end is effectively barricaded off at a safe distance iii. The stopped end is cleaned out and checked for misfires and all sockets in the stopped end must be cleaned out with high pressure water

4.7	**Work in two development ends approaching water or gases**	a. In a mine which is liable to an in burst of water or gas, the responsible person appointed by the Mine Manager/Technicians should at all times be aware of the locations of faces being advanced, and should identify all the relevant precautions and steps that personnel should take in the event of an in burst are clearly defined b. Suitably directed boreholes should be drilled from the working face and be sufficient in number and length to give ample warning of presence of water or gas c. A competent person, appointed by the mine operator, should inspect shift every part of the mine where in burst is likely; i. immediately before the commencement of every shift; and ii. during the course of every
4.8	**Safety Crown Pillars to be set**	a. Safety (Crown) pillars must be set out and defined at every mining operation taking in consideration the geological conditions of the rocks b. The Mining technician must ensure that a safety crown pillar of reasonable thickness is provided to prevent collapse of the roof in the following situations; i. Pillar above the first horizontal tunnel off the shaft taking ii. Pillars defining the distance between two horizontal drives, tunnels or sublevels iii. Pillar above the adit drive

5.0 BLASTING OPERATIONS

	STANDARD	GUIDELINES
5.1	**Charging operations standard procedures**	a. Only approved persons shall carry out blasting operations and the approved person shall be responsible to;. i. To ensure that drilled holes are pumped clean before charging them with explosives. ii. Be responsible for the safety of any person assisting him in charging up operations; all other persons not engaged in the operations shall be removed to a safe place. b. All holes to be blasted must be charged at scheduled primary blasting times only and within a reasonable time before blasting. c. If such charged holes for any reason are to be left unattended before being blasted the blaster shall ensure all entrances are effectively barricaded and bearing the words 'CHARGED UP AREA, NO ENTRY' or guards to be placed. d. Before blasting any charges, all entrances to the area must be effectively guarded either by means of suitable barricades and notices or by the placing of persons to act as guards to avoid any danger from such blast from flying debris, dust or fumes. e. Communicate the intention to blast by use of sirens etc f. Ensure that any explosives taken into working place are kept in a safe place at a reasonable distance from any drilling or other operation. g. Do no enter, permit or instruct anybody to enter a place where charges have been blasted until the fumes have been dispelled. h. Wait at least 30 minutes from the time of lighting the fuses before approaching a place where a misfired charge is known or suspected.

6.0 SUPPORT OF MINING TUNNELS

	STANDARD	GUIDELINES
6.1	**Timber and Mine support guidelines**	a. Support systems must be designed, selected, used, installed, maintained and removed taking into consideration of the various rock conditions that may prevail. b. The Mine Managaer/Technician must appoint a responsible person to ensure that particular attention is given to the support of the area in the vicinity of the working face. In this regard, the timing of the installation and removal of temporary and primary support is important and, together with examination and making safe procedures, must be specifically dealt with c. Underground development support in less stressed Small Scale Mining must focus on the installation and maintenance of supports in the stressed areas, main haulages or tunnels and traveling ways. d. Timber sets shall be used to support excavations that have been driven through poor to very poor ground conditions or temporary excavations. Timber sets can be installed in haulages, material cross cuts, service drifts and undercuts and any other excavations or openings where the limitations of span and height will permit. e. Square timber sets shall be used in main drives, three piece timber sets in smaller drives and undercuts, false cap and pony sets for various tunnel/excavations configurations to provide passive support of hanging and side walls.

6.1.2	**Materials and Tools requirements for timber support work**	a. Materials required tools for timber sets are; Timbers, nails (sizes from 100mm to 150mm); 4 Kg hammer, bow saw, shovel, timber-mans` staff, twine, pinch bar.
6.1.3	**Preparation of Timber set support**	a. Support when required should be done early and safe working procedures should be followed. In areas with weak conditions props should be done to provide a safe working environment immediately b. Obtain Information or a plan on the type of support and area to support The area should be checked for preliminary requirements, such as slyping, installing of survey reference points, marking of grade and centre lines close to the area. c. If required, prepare special foundation such as a concrete base for each timber set . Preparations of this nature should be done in advance.

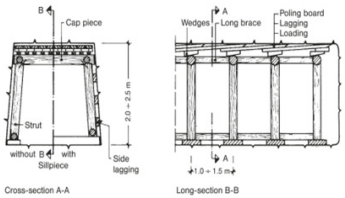
6.1.4	**Installation of Timber sets**	a. The timber sets must be installed centrally to the excavation on direction and grade. b. Preliminary work shall include. i. Lash and clean to footwall. ii. Transport materials and tools to work site. iii. Bar and wash down, install prop support and as head cover for protection. iv. Establish the centre and grade lines c. Erecting the timber set. i. Lash to solid rock footwall and/or level off where necessary, if foundation is not laid in advance. Where intervals between sets are pre-determined, the leg position can be made ready well in advance of installation. ii. Set legs- Cut the two legs from round poles, 225mm x 225mm or 200mm x 100mm timbers. For the square timber set, these will be cut squarely at the top.; the three-piece drive set timbers will be cut 5 degrees off square on both ends so that the legs will lean in wards at 85 degrees on erection, in order to oppose the buckling effect. iii. Position the two legs on either side, measuring from the centre line. To maintain the legs in an upright position temporary, nail 200mm x 50mm timbers on the outer side, align them centrally and secure in the footwall. iv. Cap- Measure, cut and lift cap and fit into position on top of the legs squarely. Sprag on to the sidewalls using blocks with minimum wedges v. Spreader and studdle- With timber-mans` staff measure the distance between the legs at the top just below the cap. Cut 200mm x 50mm timber to required length and nail under the studdle (divider) timbers vertically across the joint between the legs and cap.

		vi. Sill- Measure the distance between the legs at footwall position. Cut 200mm x 50mm timber and nail across from one leg to another as sill timber [most applicable where there is no plinth foundation]. vii. Spacers- Measure 1.8m centre-to-centre for the next set. Erect second set in similar way as the first. Nail 200mm x 50mm timbers from one leg to the other on either side, at 0.6m from footwall and 0.3m from the cap as spacers. Spacers are to cover only half the width of the leg in order to leave space for the next spacer. viii. Cribbing and top lagging- On top of the cap, directly above each leg, run 200mm x 100mm timbers from cap to cap, and place similar timbers at 0.5m intervals across the span. These form the first row of cribbing timbers. Between the cribbing timbers, place 200mm x 50mm timbers extended from cap to cap as top lagging. A gap of up to 100mm can be maintained between timbers for bleeding purposes. ix. Side lagging- Install 200mm x 50mm side lagging timbers by nailing these onto the legs on the outer sides. Gaps of about 0.3m must be maintained between side laggings for bleeding purposes. x. Additional cribbing- The next row of cribbing timbers are placed across the bottom row, ie running from one side wall to the other, maintained at similar intervals of 0.5m. xi. Pony set- If the ground has peeled off upwards across the span of the excavation in excess of 1.2m above the timber set cap, a pony set is installed. Legs of 0.5m length are cut 5 degrees off square on both ends. These are installed on top of the cribbing timbers, with cap and further cribbing until the hanging wall is reached.

		xii. False caps- If the ground is peeled off asymmetrically upwards in excess of 0.5m above the timber set cap, a false cap is installed. xiii. Caps are installed over the first set in a normal way. On the side where ground is peeled to the highest point, with two or more blocks placed over the cap directly above the position of the leg. xiv. The false cap is then installed to rest on the blocks on one side, and on top of the cap on the lower hanging wall side. xv. After two consolidated sets, sill timbers and temporary support timbers can be removed. xvi. Only hardwood wedges should be used and a minimum of two of them. All wedges must be installed to last as long as the whole set lasts.
6.2	**Timber pack support standard**	a. Scope of timber packs supports offer passive support The pack must withstand compression from either elastic convergence or the dead weight of separated strata or fractured rock block b. Effectiveness of timber pack. Stiffness is required for a timber pack to give maximum support. c. Purpose and application of timber packs. Timber packs must be constructed as pillars in shallow dipping drives for the purpose of controlling strata separation, loosening of fractured rock and hanging wall surging.

6.2.1	**Timber pack support requirements**	a. Slab timbers, 225mm x 225mm, 200mm x 100mm timber, round poles, hardwood wedges and normal timbermans` hand tools. b. Area must be wide enough with a regular footwall. The wider the area the better as compared to height. c. Water increases creep in timber, therefore, timber packs do better in dry conditions. Denser timbers are less susceptible to creep because of their strength and less moisture absorption d. Fill material- Sorted competent waste rock should be used.
6.2.2	**Timber pack preparations**	a. Lash to footwall and level off. b. Bar and wash down and make safe. c. Transport all materials to site. d. For composite timber packs, concrete brick mats are to be made in advance. e. For timber mat packs; the mats are threaded in advance with iron bars.

6.2.3	**Construction of timber pack**	a. Prop up and wedge two up right side lagging timbers on the down dip edge of the support area if the footwall has a gradient of more than 5 degrees. If the footwall is flat, no up right side lagging is required. b. Lay first base timber against the up rights, to extend across the support area up to side wall. Lay second base timber 0.3m away from first timber up dip. c. Place first deck timber to rest on footwall at extreme up dip end and on top of the first two base timbers on the down dip side. More second base timber up and down dip until decking timber stabilises. d. Place other decking timbers towards side wall, maintaining 0.3m between them. e. Fill up spaces between base and decking timbers to level of first decking with clean sorted waste rock as fill material. f. Place next decking timbers across the first decking. Each timber must be cut to extend from limiting edge of the timber pack to the rock face on the side wall, with 0.3m intervals maintained. g. Fill up second decking level with fill material. h. Continue decking, positioning each decking timber in the same position as preceding decking timbers of similar direction. i. Build timber pack to hanging wall. Block and wedge against hanging
6.3	**Other Support – Steel Archs**	a. In hard rock mining, limited application since most support duties can be performed more effectively by rock bolts, dowels or shotcrete or by some combination of these systems b. Where used in mining through faults or in very badly broken ground associated with faults of shear zones. In such cases, it may be impossible to anchor the rock bolts or dowels in the rock mass and steel sets may be required c. Application in small scale mining is limited due to cost compared to timber

6.4	**Other Support - Roof bolting**	a. Rock conditions shall determine the type of rock bolting support The method will be used where the ground condition requires the rock formation either to be reinforced and form part of the reinforced rock-mass b. Use of Grouted re-bars and wire dowels is the most common method of rock bolting support.
64.1	**Minimum Requirements for roof bolting installation**	a. Drilling equipment, pedal pump for grouting and accessories. b. 200mm x 100mm timbers for prop support. c. Safety goggles, nose/mouth cloth respirators, water proof suits. d. Wire dowels or Rebars of the appropriate sizes; 1.5m, 1.8m, 2.1m or 2.4m. e. Pockets of cement, a 210 l drum cut into two portions, sieve (< 5mm mesh), mixing puddle or stirring stick, cotton or waste paper, 5 litre bucket f. Drilling pattern and method established
6.5	**Procedures on Timber Support Inspections and Maintenance**	a. A Manager/Technician must specifically appoint person who must examine all haulages and traveling ways once, a week and enters the results of the examination in a special log book. The examination must include – i. Quality of the timber setts ii. Any noticeable movement on the sets iii. New areas requiring support
6.6	**Illustration of a square Timber set**	Support illustration  Fig 3 – Example of timber set

6.7	**Trees used for Timber support**	a. Timber used for mine support must have a long fiber structure. This includes the types such as spruce, fir, or other conifer wood, or eucalyptus. b. In Rwanda Eucalyptus is widely grown and shatters slowly when the loading capacity is exceeded and thus warn the miners through a definite creaking.

7.0 MINE VENTILATION

	STANDARD	GUIDELINES
7.1	**General requirement for ventilation at a mine**	a. The mine operator shall excavate a second shafts or egress for the purpose of ventilation. In that way, air naturally ventilates the working areas to facilitate an effective and sufficient natural pressure gradient. Where implemented two mine outlets must be located on different elevations b. No mineworker should enter any work place underground, in particular those places with poor air circulation, unless the air has been checked therein to ensure a safe breathable atmosphere free from levels of hazardous gases. c. The Mine Manager/Technician shall ensure that adequate and effective ventilation is supplied to all places in a mine where persons are working or travelling d. Consquences of poor ventilation shall be i. heat exhaustion where temperatures are excessive; ii. exposure to blasting fumes, which can lead to unconsciousness and even death; iii. exposure to excessive levels of diesel particulates, which can lead to occupational health issues such as lung damage; and iv. increased exposure to risk when fatigue results from a poor working environment. v. Fatality due to lack of adequate oxygen

7.2	**Ventilation planning process at a mine**	a. The process of planning for ventilation for an operating mine, as indicated in the figure below b. Ventilation system must be able to supply a quantity of oxygen for breathing purposes at minimum of 19% by volume; c. The ventilation system must remove heat and provide comfortable working conditions and hence improve production; d. The ventilation system must dilute and remove noxious and flammable gases that may be encountered during mining operations; and e. The ventilation system must dilute and remove hazardous airborne pollutants created by various mining operations underground (e.g. dust, fumes, aerosols, vapours, etc.).

7.3 Quantity of oxygen required in mines

a. The air in areas where persons work or travel in mines must contain at least 19.5 percent oxygen and not more than 0.5 percent carbon dioxide, and the volume and velocity shall be sufficient to carry away flammable, explosive, and harmful gases, dusts, smoke, and fumes

b. The table below shows the effects of reduced oxygen supply

Oxygen in air (%)	Effects
19	Flame height on a lamp or candle reduced by 50%
17	Noticeable increase in rate and depth of breathing – this effect will be further enhanced by an increased concentration of carbon dioxide
16	Flame on a lamp or candle extinguishes
15	Dizziness, increased heartbeat
13-9	Disorientation, fainting, nausea, headache, blue lips, coma
7	Coma, convulsion and probable death
Below 6	Fatal

Table 2- effects of reduced oxyen supply

7.4	**Monitoring of Ventilation Fans**	a. In underground excavations longer where ventilation is poor ventilation, fans will be installed underground to produce the required airflow to the working ends. b. The fans shall be powered by means of a compressor or electricity. c. To assure electrical and mechanical reliability of main mine fans, each of the Compressors and the main mine fan and its associated components, shall be examined for proper operation by a trained person d. A fan and compressor monitoring system, using a log book for examination of the machinery shall be in force at the every mine and shall be completed prior to anyone entering the mine. e. Assess fan capacity to deliver air to the all the working ends f. Monitor and implement development of return air drives g. Adhere to re-entry procedures in mines with blasting h. make shift supervisors aware of the ventilation standards in their operating areas
7.5	**Prohibition of actions affecting Ventilation in underground environments**	a. The use of machinery, water pumps that will produce toxic gases must shall not be allowed i. unless in wide workings with adequate ventilation and in such cases monitoring of gases shall be periodic and recorded and made available for inspections ii. unless fitted with mechanisms to trap the diesel fumes, shall not be allowed b. Use of candles is not allowed in the underground mines c. Use of substances producing toxic gases fire, burning and any other is not allowed

8.0 QUARRY AND OPEN PIT EXCAVATIONS

	STANDARD	GUIDELINES
8.1	**Safety of open pit and quarry excavations**	a. In open and quarry operations, where the vertical height of the face exceeds three meters and where explosives are used, bench drilling should be carried out from the top of the bench b. A face should not be drilled in a manner which will create an overhang of the face, and where unconsolidated rock is mined; the face and sides should be battered (that is, be at an appropriate angle) to prevent a collapse. c. A face should not be undercut by the excavation of a slot at the toe of the face apart from the purpose of driving a tunnel or adit being driven into the face. d. Where a person is required to work manually at the bottom of the bench of a quarry face or on the face itself, the face should be scaled of any loose rock which could fall on that person. e. In an area close to population areas, the manager may need to fence against inadvertent access to the faces. f. In open excavations, persons are not permitted to walk on the edge of an excavations. They must walk 2.5 meters away from the edge of the excavation. g. All loose material on the surface or on any bench must be cleared for a to allow a clearance of at least two metres from the edge; h. In excavations mined manually , a face or sidewall must not exceed a vertical height of 1.5 metres unless the face or sidewall is sloping at an angle sufficient to ensure the safety of persons; i. Where mechanical equipment is used for digging and loading, suitable precautions shall be taken to ensure that the operator of the equipment and any other person is not exposed to any danger from any face or sidewall

8.2	**Bench Heights**	a. In mechanical operations, the open pits must be designed with the bench heights that take in consideration the strength and characteristics of rock mass. The heights of softer rock must be not exceed 5 metres at the given slope angles. b. The bench width must be considered using the formula from the SME Handbook Bench width (m) = 0.2 x bench height + 4.5 m; recommended by the SME Mine Engineering Handbook (1992). c. The guide to the Berm height and width can be derived from the following formula Berm height = 1m +0.04H (H= 10m) (Kennedy) d. In manual excavation, the mine operator, will ensure that the bench height in such operations do not exceed 3m
8.3	**Waste dumps**	a. Dumping must be systematic and top soil materials that can be used for re-vegetation must be dumped separately b. The waste dumps must be designed taking into criteria the type of rock type. The soft rock type such as sandstones, clays and schists will be dumped in such that the slope angle not exceed the natural angle of repose. The broken or crushed rock dump will have a slope angle not exceeding the natural angle of repose c. The dumps shall be designed in such a way that there is a berm on the edge of the dump and a retaining catchment berm at the foot of the dump. The berm height where dumping by vehicles must be 50% of the dump vehicle tyre size d. The height of the dump must not exceed 10 metres. At such height, the slope angle shall not result in that greater than the natural angle of repose for the given materials

8.4	**Safety Berms at pits**	a. The dimensions (height and width) of the safety berm on the open pit haul roads and benches are determined using a global standard practice i. Berm height = 50% of the tyre diameter ii. Berm width = 2 X berm height/tan 350
8.5	**Open Pit drilling and blasting**	a. Mine site must develop standard procedures on the safe operations of the excavating, loading and haulage equipment at the mine site b. The Blasting Regulations in the Department will save as the guide during the blasting operations
8.6	**Procedures on safety operations of mining equipment**	a. Mine site must develop standard procedures on the safe operations of the excavating, loading and haulage equipment at the mine site to ensure safety of the operators, employees and equipment

9.0 AIR COMPRESSORS AND UNDERGROUND LIGHTING

	STANDARD	GUIDELINES
9.1	**Air Compressors underground** **– General requirement**	Any compressor which compresses air, used underground in a mine, should be designed, constructed, operated, regularly tested and maintained for the following reasons; a. air entering the compressor is not contaminated by pollutants and is as dry, clean and cool as practicable; b. only high-quality mineral oil or suitable synthetic oil, having a specified flashpoint, should be used for lubricating the compressor; c. services should be supported from properly secured fastenings, which should not be used for any other purpose, and the number of fastenings should be adequate;

		d. services hung in haulage and travel ways (including ladder ways) should be installed in such a manner to provide for adequate clearance for persons and equipment; e. pipelines should be connected by approved couplings; and f. no repairs should be carried out while any service is under pressure.
9.2	**Underground lighting** **– General requirement**	a. It shall be a requirement that every mine provides suitable fixed lighting to employees involved in working in underground work with camp lamps or torch light and such devices that are allocated to employees must be approved by the Inspectors. b. The Mine responsible person must ensure personal lighting for underground use for workers are in place c. Workers should only take fully charged batteries d. Lamps should be maintained regularly. e. Cap lamps globes should be checked for correct operation before proceeding underground. f. Cap lamps must not be taken into mines unless they are fully functional and secure; and g. The camp lamps or torch light must be in a condition to illuminate the workings adequately and the batteries must have longevity to last a minimum of 8 hours

9.2	**Safe use of Electricity**	a. Where electricity is used in mine workings, the mine operator must ensure that a competent person is appointed to be responsible for all the electrical installations b. All electrically operated equipment be shall selected, arranged, installed, protected, c. maintained and operated in such a manner as to prevent danger. d. To every electrical circuit, effective means, suitably placed,for isolating the supply of electricity from the circuit shall be provided to prevent danger. e. There shall be provided such effective automatic means of preventing the energising of any electrical circuit or electrical apparatus to prevent danger.. f. Every electricity generating plant and all substation equipment shall be adequately fenced or enclosed and notices prohibiting unauthorised persons from entering shall be placed g. No inflammable or explosive material shall be placed in Dangerously near to any electrical apparatus. h. All material used for the purpose of insulating any conductor shall be suitable, having regard to the degree of insulation and mechanical strength required

10.0 PERSONAL PROTECTIVE EQUIPMENT

	STANDARD	GUIDELINES
10.1	**Personal Protective equipment –General requirement**	a. The Mine operator must ensure that at all time he provides personal protective safety equipment to all employees, contractors and visitors and further ensure that all people required to use the PPE do so correctly and that the maintain PPE in good condition
10.2	**Safety Footwear**	a. Persons working and visiting mining operational areas that are marked as requiring safety footwear must wear compliant safety footwear and it will be the duty of the Mine Operators to prescribe the operational areas where safety boots and shoes are compulsory. b. All safety boots and/or safety shoes must comply with the specification for safety footwear in mines. The standard safety shoe must have a hard sole to prevent penetration and a steel capping to protect the toes
10.3	**High Visibility Attire**	a. Employees working in an underground and/ or open pit environment where the operations involve the use of motorized machinery must wear suitable high visibility attire
10.4	**Eyewear**	a. Persons working in or visiting mining operational areas that are marked as requiring the use of eye protection glasses must wear compliant eye protection glasses and goggles. b. It will be the duty of the Companies to prescribe the operational areas where the use of safety eyewear is compulsory. All safety eyewear or glasses must meet the required specification

10.5	**Safety Helmet**	a. No person shall enter or remain in the operational area in any of the following places unless that person wears a safety helmet of a type approved in writing 1. underground; 2. any open pit except with the permission of the Mine Technician/Manager 3. any other place which the manager has designated as safety helmet area b. All safety helmets must meet the requirements specification for industrial safety and must allow a provision for use of earmuffs and have a provision for holding a lighting cap c. The use of safety helmets must be compulsory where there is any risk of head injury. Mining operators must clearly prescribe operational areas and shall clearly mark out the areas where the use of Hard Hats are compulsory
10.6	**Clothing**	a. The mine operator shall provide clothing for use at mining operations. Cotton overalls or work suits shall be the normal work wear in mines. Strips of reflective material will be added to make the miner more visible to drivers of in case of motorized operations involving underground vehicles.

10.7	**Hear Protection**	a. Where excessive levels of noise exist in any working place, steps shall be taken to abate the levels of that noise and where this is not possible the manager provides suitable protective hearing devices those devices shall be used at all places specified b. Persons working in or visiting mining operational areas that are marked as requiring the use of ear protection must wear compliant ear protection muffles or ear plugs. It will be the duty of the Companies to prescribe the operational areas where the use of safety ear protection wear is compulsory. c. The Mine Operator shall take measures to eliminate or isolate noise. Appropriate hearing protection must be supplied and worn in any environment exceeding the noise permitting levels
10.8	**Safety harness**	a. Any person working in a place where he may fall more than two metres shall be provided with and wear a safety belt or harness approved in writing by the DEPARTMENT which shall be securely attached to the wearer and to a safe anchorage; b. Where the lanyard of the safety belt or harness is too short for use when attached to the safe anchorage, an anchor chain shall be attached to the safe anchorage and the lanyard shall be securely attached to the chain c. Where more than one person is attached to a safe anchorage, the strength of the anchorage shall be increased in proportion to the number of persons attached to it; d. No person shall use any safety belt, harness, anchor chain or other lifeline until he has examined it prior to use and has satisfied himself that it is in good condition;

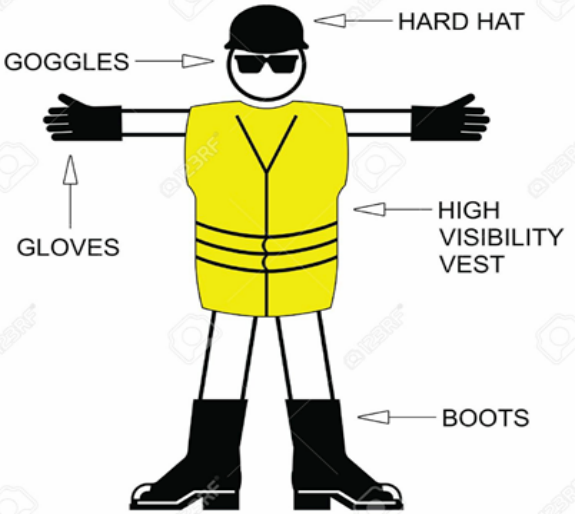


Fig 5 - Illustration of PPE

	Display of Mandatory signs of PPE	a. It shall be mandatory for the Mine Operator to display PPE wear signage as displayed in Fig 5 and 6

Fig 6 mandatory requ irement

11.0 HEALTH OF EMPLOYEES

	STANDARD	GUIDELINES
11.1	**Noise Level surveys**	a. Noise surveys are conducted in areas where noise exposure is likely to be hazardous b. A noise survey must involve measuring noise levels at selected locations throughout an entire plant or in workplaces underground to identify noisy areas. c. The noise survey must identify i. areas where employees are likely to be exposed to harmful levels of noise and PPE may be needed; ii. machines and equipment which generate harmful levels of noise; iii. employees who might be exposed to unacceptable noise levels; and
11.2	**Noise levels permitted**	a. Where noise levels are above 85 decibels (dB(A)) a full investigation of the cause should be undertaken with the aim: i. reduce the noise level to below 85 dB(A); ii. designate high noise areas as "protective zones"; and iii. provide appropriate hearing protective equipment b. No person should be subjected to a noise level greater than 115 dB(A) without protection. c. The noise measuring instruments must be periodically checked for correct calibration and must have high precision

<table>
<tr>
<td>11.2.1</td>
<td>Typical Noise levels from mining activity</td>
<td>
<table>
<tr><th>NOISE</th><th>SOUND LEVELS (DBA)</th></tr>
<tr><td>May break a plate glass window</td><td>160</td></tr>
<tr><td>Threshold of pain</td><td>120</td></tr>
<tr><td>Pneumatic drill</td><td>100-120</td></tr>
<tr><td>Shovel (diesel)</td><td>107</td></tr>
<tr><td>Timber saw</td><td>100</td></tr>
<tr><td>Screens</td><td>95-100</td></tr>
<tr><td>Compressor</td><td>90-100</td></tr>
<tr><td>Cursher</td><td>90-100</td></tr>
<tr><td>bulldozer</td><td>85-106</td></tr>
<tr><td>FEL/dump truck</td><td>80- 95</td></tr>
<tr><td>City traffic</td><td>65- 75</td></tr>
<tr><td>Quiet office</td><td>50</td></tr>
<tr><td>Threshold of hearing</td><td>0</td></tr>
</table>
Table 3 – table of noise levels generated
</td>
</tr>
<tr>
<td>11.3</td>
<td>Temperatures</td>
<td>
a. Mine operators should ensure that measures and precautions are implemented to protect employees from heat related developed at mine sites.

b. Managers and supervisors should ensure that the safety and occupational health needs of people working at the mine are appropriately monitored and workplace temperature hazards are detected

c. Mine operators should:

i. appoint trained staff to measure the appropriate heat stress index and monitor employees for heat illness;

ii. establish cool rest areas that have cold drinking water and are close to “hot” work sites;

iii. provide suitable canopies, cabins or clothing to protect staff from direct sunlight in above-ground mines; and
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</table>

11.4	**Symptoms and treatment**	a. Heat exhaustion The symptoms of heat exhaustion are headaches, dizziness, light headedness, weakness, mood changes, (that is, feeling irritable or confused), vomiting, decreased and dark coloured urine, fainting and pale clammy skin. If heat exhaustion is not treated, the illness may advance to a heat stroke. b. Heat stroke The symptoms of heat stroke are dry pale skin (no sweating), hot red skin (looks like a sunburn), mood changes, (that is, feeling irritable or confused), seizures, fits, collapse and unconsciousness. c. Treatment All cases of heat illness must be taken seriously as there is a high risk of death resulting from lack of treatment. Medical attention must be sought as soon as possible. All cases of heat stroke must be treated as an emergency and the patient taken to hospital.
11.5	**General information on Dust Control**	a. Appropriate Personal Protection Equipment must be used where dust particles of size ranging from 0.001 to 0.1 mm (1 to 100 microns) are encountered airborne to prevent reducing visibility, irritation of eyes, ears, nose, throat and skin and damage to the tissues of the lungs.

11.5.1	**Control methods of dust**	a. The strategy to control dust must include the establishment of a dust control program for the purpose of i. monitoring and analyses of airborne dust; ii. implementation of corrective action to control generation of dust and iii. limit employee exposure to dust, where required; and iv. personal exposure records. b. The methods by which dust in working places is controlled include the following: i. wet drilling, water mist drilling and drilling ii. proper ventilation of working places, particularly dead ends (for example, by supplying dust-free air to the face); iii. wetting muck piles when moving broken rock, loading trucks or dumping into bins or stockpiles; iv. use of wetting agents with water in selected processes v. use of total wet processes in crushing and screening plants

11.5.2	**Dust limits and Sampling**	a. Dust limits shall be based on personal exposure for a standard shift of eight consecutive hours and calculated as a time-weighted average b. The method of determining dust limits shall be through the use of dust sampling methods c. Dust sampling shall: i. identify and quantify airborne dust a person has been exposed to or would be whilst performing a work activity; and ii. if concentration cannot be determined from dust sampling, assume the dust originates from the rock being extracted or processed.
11.5.2	**Medical examination**	a. Employees working physically in diggings, underground transportation, blasting, drilling, processing will present a medical certificate of fitness before the first day of assuming work b. Medical examinations must be conducted on all employees on following tests : i. Hearing ii. Blood pressure iii. Vision iv. Lung (Breathing)

12.0 MINE FACILITIES

	STANDARD	GUIDELINES
12.1	**Location of offices, first aid facilities and parking**	a. All offices, first aid room and parking facilities should be located outside the operational area and must be easily accessible b. It shall be a requirement for a mine Operator to set up suitable facilities at the mine site
12.2	**Toilets Facilities**	a. A mine operator shall ensure that adequate toilet facilities are provided in proximity to working places for men and women separately b. Sufficient and suitable latrine accommodation shall be provided at the mine workings and the latrine facilities shall be well ventilated, well lit and kept in a clean condition.
12.3	**Change house facilities**	a. Change house facilities where implementation is a requirement, shall be provided with the following i. Adequate facilities for bathing respecting gender ii. Adequate facilities for drying clothes iii. Suitable toilet facilities for men and women iv. Suitable facilities for storing workers personal items

12.4	**First Aid Room Records**	a. For every 50 workers at a mine site, the mine operator shall ensure that there is a room available to be used as a first Aid Room and equipped with the required kit and equipment as provided in the mining safety standards b. The requirements for the first aid facility are laid out in the Appendix to this Standard c. There will be recorded in a book particulars of the following i. case treated, stating the name of the injured or sick person, ii. the nature of the injury or illness, iii. the treatment given, iv. the name of the person administering the treatment and the date and time of the treatment

13.0 REPORTING OF INCIDENTS AND ACCIDENTS

	STANDARD	GUIDELINES
13.0	**Incident reporting**	a. All injuries, no matter how slight, must be reported immediately to the responsible mine official b. An incident report form must be completed and taken, with the injured, to the Health Centre/ clinic/hospital d. The incident report form is as set out in the Appendix to the Mining Standards f. Every mine operator shall ensure that a register of all incidents and accidents occurring at the place of work is maintained at the operational g. A preliminary report form must be completed within 24 hours of the incident happening i. A final investigation report will be conducted and report sent to Department within 48 hours
13.1	**Reportable Accidents**	a. The following shall be reportable accidents and notification to the Department shall be immediate: i. Involving death of a person ii. in which any person becomes unconscious or is admitted in hospital for more than twenty-four hours following heat exhaustion, inhalation of explosives gases or any poisonous gases and electric shock iii. Incidents in which the injuries sustained by any person could lead to permanent disability

		b. The following types of incidents occurring at the mine site shall be reported to the Mine Inspectors within 24 hours of occurrence using the quickest possible communication means i. Any accident due to explosives including an accidental ignition or detonation of explosives ii. the flooding of any considerable portion of the workings or the failure of any dam or reservoir used for conserving water or slimes; iii. any accidental explosion or large fire due to the ignition of dust, gas, oil or vapour; iv. any accidental fire underground or accidental large fire on the surface; v. any electrical shock or burns to a person who consequently receives medical treatment; vi. the extensive caving of any underground working or any extensive subsidence of any ground which is not normal for the method of mining in practice; vii. any prolonged failure of the main ventilation system or part of it; c. The reports will be made out in the reporting format set out in the Appendix to the mining safety standards

13.2	**Analysis and classification of incidents**	a. Incidents must be analysed and classified according to the source of the incident as follows; i. Fall of ground ii. General machinery iii. Electricity iv. Fires v. Mining tools vi. Shafts vii. Inadequate ventilation

14.0 MACHINERY ISOLATION PROCEDURES

	STANDARD	GUIDELINES
14.1	**Isolation Procedures**	a. The isolation procedure shall be a systematic way of identifying the sources of energy that, if uncontrolled, could cause injury; and controlling the activation of that energy source by other people. The procedure must be done as follows; i. Step 1 – Identify all equipment to be isolated Confirm that the switches, valves, chains, locking pins and other devices to be used to isolate the system are the correct ones as per example in Fig 6 ii. Step 2 – Determine the correct point of isolation Positive isolation can only be achieved by isolating the sources of energy from the equipment to be worked on. Use main switches, circuit breakers, de-contactors, valves, locking devices for isolation. Do not use push button, conveyor lanyard switches, control circuit devices. iii. Step 3 – Carry out the isolation iv. Step 4 – Test the effectiveness of the isolation v. Step 5 – Place safety lock/tag(s) on isolating device(s)
		 Fig 6 – isolated switch

15.0 TAILINGS STORAGE

	STANDARD	GUIDELINES
15.1	**Storage of tailings**	a. The selection of the tailings storage facility (TSF) must offer the safety, long term storage of tailings with minimal environmental impact
15.2	**Design and Operating requirements of a TSF**	a. The design and Construction of a TSF must be undertaken and supervised by a suitably experienced contractor b. In the Operational phase, an Inspection and audit by specialist engineer shall be done every year c. A plan for rehabilitation and decommissioning of TSF must be made by a specialist engineer and maintained at site by the Mine Manager/ Technician d. The Mine Manager/Technician will ensure that the mine has a developed Emergency Response action Plan on the TSF e. A log book on the periodic inspections on the TSF that are carried out by the by site personnel shall be maintained at the mine site
15.3	**Information required for design and inspection**	a. Location, with tenement details, Co-ordinates and a suitably scaled plan shall be made b. The Mine manager shall ensure that the TSF has a rated throughput as dry tonnes/year and ensure that storage is within the capacity c. The TSF shall only store the Ore Type(s) that are listed in the design d. The Mine Manager shall ensure that an inspection on the TSF is made and has details on environmental performance to date

16.0 EMERGENCY PREPARDNESS PROCEDURES

	STANDARD	GUIDELINES
16.1	**Emergency preparedness and response plan:**	a. The Mine Operator will develop an emergency preparedness and response plan to include response in the event of an emergency. The plan will incorporate; i. Procedures to follow in case of an emergency ii. The sounding of emergency alarm. iii. Designated evacuation routes and procedures iv. Nearest assembly points. v. Conducting a roll count of all persons on site. b. Only trained and competent persons are allowed access to emergency areas to respond to emergency situations. a. The Mine Manager must always ensure that safe conditions and entry is established and re-entry is announced.
		. Personnel must look out for signs that must be standard as follows;  

		  EXIT
		 Fire assembly point

16.3	**Workers exposed to chemicals**	a. At site where workers are likely to be exposed to chemical, clear signs must be in place and look for the signs    
16.4	**Fire Fighting Equipment**	a. In event of fire personnel must look for the fire extinguishing equipment

		  
16.5	**Medical Emergency Signs**	The following signs will be used for medical emergency The CROSS indicates the First Aid Box the arrow the location of the FIRST AID box / Station.
		

16.6	**Standard Procedure on underground fires**	a. Immediate action in case of a fire. i. Any person discovering or noticing a fire must report to the responsible person who must promptly: ii. Raise an effective alarm and warning. iii. Withdraw all persons to the fresh air side away from the fire. iv. Notify the nearest available senior official. v. Prevent entry of any person/s to the fire affected area. vi. Warn all personnel in adjacent or affected areas of the fire break up. b. Persons on the return air side of the fire should not try to pass through the fire, but instead should proceed to fresh air side and safety by another route. c. Should exit route by another way not be possible, the trapped personnel must turn on compressed air fully to surround themselves with a zone of fresh air
16.6.2	**Duties of a Mine Manager/ Technician**	a. Check that all persons have been removed to the fresh air side b. Appoint a scribe, recorder or secretary to record all messages (verbal or by telephone), instructions issued and received between surface and underground control points. c. Establish a fresh air base underground. d. Arrange logistics such as feeding, changing, accommodation facilities for visiting Rescue team, Government Inspector/s or Police Officers; if required. e. Consolidate transportation arrangements for casualties from endangered zone to hospital.

16.6.3	**Fighting the fires**	Summary of main stages for controlling and extinguishing fire. a. Recognize the essential components of the combustion reaction and promptly remove them with competence: i.e. fuel, oxygen and heat. b. Finally, by smothering the fire and extinguishing any residual flames or sparks by use of sand, water, fire extinguishers. c. After a major fire, keep the site under observation and surveillance by competent persons for at least 48 hours. d. Ventilation must be checked in establishing re-entry time to the area that was affected by the fire, subject to the final approval by the Mine Manager/ Technician and/or the inspector of mines. e. Electrical power supplies to sections must be thoroughly checked and inspected under the supervision of a competent mine official
16.6.4	**Prevention of fires**	a. Watch for and clean up rubbish accumulation of combustible rubbish. b. Know the location of fire extinguishers in the section and make them readily accessible. c. Extinguish a small fire on discovery if this can be done by smothering, use of sand, water or fire extinguisher. d. Take precautions to avoid damage to electric cables, whether by direct violence, careless moving of heavy equipment or by blasting. e. Do not accumulate inflammable rubbish anywhere in the mine in the proximity of inflammable materials

16.7	**Standard Practices on mine drainage.**	a. The procedures and installations designed to prevent flooding of the mine must be examined to ensure their effectiveness and must be modified whenever and wherever necessary. b. Ensure systems monitoring of water drains processes in the development/production sections from the following sources i. From surface due to rains ii. From water springs/aquifers underground . iii. Water that formed together with the rock formations c. De-watering boreholes (long and short) must be drilled into aquifers from various mine openings in compliance ensuring that advancing of headings is done in ground which is rendered safe from large and dangerous accumulations of water, mud or gases. d. A separate access to the mine must serves as the service access to access the mine in case of a flood

16.0 SECURITY AND ACCESS CONTROL

	STANDARD	GUIDELINES
16.1	**Security control of Persons visiting and working at mine site**	a. All visitors shall at all times report to security upon arrival and before entry into premises/ Mine. b. Only authorized vehicles are allowed access to the mine. c. All persons shall stay clear from "No-Entry Zones" unless entry is authorized. d. Alcohol and Drug testing shall be done before entry into mine by visitors and employees randomly before work commence.
16.2	**Mandatory signs to be obeyed**	a. Signs will be placed at visible places at the mines and must be obeyed at all times by persons working at the mines or visiting the mines
		

16.3	**Signs to prohibit alcohol and drugs at mines**	  

17.0 MINERAL BENEFICIATION

17.0	**Mineral Process activities impact on Safety and Environment**	a. All mineral processing activities must be carried out in such a way that operations minimize harmful practices on the environment b. Use and discharge of harmful substances in process is prohibited c. Discharge of dust in the air must be controlled by the operator to minimize harm to the workers and community d. Workers must have working health Insurance

17.1	**Care for Use and discharge of Water**	a. Mineral processing activities must use water resources efficiently and avoid wasteful practices b. Operations must use water in such a manner that the operation is a closed circuit, utilizing technology to recycle the same water for processing c. Water Treatment involving the removal of harmful contaminants from water before discharge to natural watercourses or re-use must be undertaken d. Tailings Sediment ponds of acceptable standard that prevents seepage and overflow of suspended particles and tailings in water must constructed e. Monitoring of quality of water and any discharge must be undertaken
17.4	**Artisanal Traditional Processing of minerals**	a. A mine operator must develop a plan of replacement of Ground sluicing methods with appropriate technology to minimize loss of minerals and prevent damage to the environment. b. The use of chemicals during physical processing methods of during communition and classification shall be prohibited c. Where ground sluicing methods are in use, the mine operator must ensure that the environmental safety measures in place in the following; i. for water conservation, ii. prevent erosion iii. prevent contamination iv. disposal of solid waste products v. prevent siltation of streams d. The mine operator shall ensure that persons involved in ground sluicing operations are provided with mandatory PPE e. Tailings from the processing must be stored in a properly constructed embankment and tailings dam

17.5	**Standard Operating Procedures for mechanized minerals Beneficiation** **e.g. crushers, mills, Jigs**	a. Mechanized mineral processing systems shall be adopted for increased efficiency, production, safety and environmental friendly. b. Mechanized mineral beneficiation shall mean adoption of processing techniques for crushings, milling or grinding, classification through jigs, classifiers, shaking tables and finally separation using a magnetic separator c. Every operator shall develop equipment operating procedure based on the user and operational manuals of the Original Equipment Manufacturer d. The standard procedure must include use and safe operation of the processing equipment, movements, safety precautions around the operational areas, maintenance, lockout, hazard identification and responsibility e. The standard procedure must clearly state the objectives, scope and

18.0 COMMUNITY LIVING IN PROXIMITY OF OPERATIONS

18.1	**Community Relations**	a. Before start of operations the mining operator must ensure they obtain a social license to operate from land owners and community representatives b. The Mining operator must recognize its obligations to act responsibly and contribute to positive community relations c. The mine operator must develop have a social Action plan in which the co-existence with the community is stated
18.2	**Protection of people Against mine health hazards**	a. The Mine Operator shall take reasonable steps to protect persons living in the mining areas against harm to the heath of people. b. The community must beprotected from harmful effects of dust, water contamination, erosion as a result of operations and noise pollution c. The mine shall put in place periodic monitoring of the environment through collection and analysis of samples

18.3	**Mine to keep mining operational areas secure**	a. The Mine Operator must ensure that the operational areas of the mine are well secured to avoid entry by people living in the vicinity of the mines b. Warning signs must be displayed to caution people c. Mine vehicles and equipment must be operated in a safe manner ensuring the safety of persons living in mining areas d. Sites ie, shafts and tunnels at the mine that for some reason are closed off and not in use must be protected and barricaded with proper signage **"DANGER , NO ENTRY"** e. Where an excavation into which a person may fall, is made, the material excavated shall be used to form a regular ridge around the boundary of the excavation
18.4	**Mine operator to protect against subsidence and caving**	a. Where any mining operation has caused or is likely to cause any crack, subsidence or cavity on the surface in any area, the whole of the area shall be kept fenced with appropriate sign to be placed warning people of possibility of subsidence b. The Mine operator will take steps to ensure that there is a designed safety pillars to protect surface installations, dwellings on top of mine workings c. Mining to occur away from settlements to prevent destruction of property and lives due to caving and subsidence

18.5	**Disturbance due to Noise**	a. Mining Companies that conduct noisy operations like blasting and heavy equipment must take steps to minimize disturbance to communities as follows i. Distribute prior blasting schedule at least 5 hours before conducting primary blasting ii. Display the blasting schedule to areas where it is accessible iii. Notify the community of any changes of operations that will likely disturb the communities 5 hours before iv. Blasting must be conducted between 7; am – 6pm (day time hours only)
18.6	**Permissible distances of mining operations likely to cause cracks**	a. No mining operation shall take place which is likely to cause any crack, subsidence or cavity on the surface within a horizontal distance of Fifty metres from any building, road, railway, lake, river, tailings dump or any other structure or feature on the surface requiring protection b. No person shall erect or construct a building, road or railway within fifty meters from the caving areas

19.0 GENERAL

	STANDARD	GUIDELINES
19.1	**Mine Plans Requirements**	a. At all mine sites, plans of the mine must be prepared and held at the site office to facilitate emergency responses and prevent injury and damage to services b. The surface plans must show the boundaries of the surface area, positions of the buildings, processing facilities, internal and access roads, geographical features and assembly points c. The positions of the mine, mine adits and shaft entries including the electricity and water reticulation lines and compressed air line must be indicated on the plans d. The mine plans must be identified by numbering and include the date they were finalized and the date they are to be reviewed and each plan should be signed by competent person. e. The plan must include location of tunnels, include ventilation, location of old workings, geological features, bore holes etc, where applicable.
19.2	**Policies and Procedures**	a. An operating mine shall develop a policy on Safety Health and Environment (SHE) b. Employees must be trained on the SHE policy c. The DEPARTMENT may require the development of other policies in safety, health and environment and standard operation procedures in order to enhance the implementation of best mining practices

19.3	**Environmental Impact Assessment**	a. It is a requirement in the law that an environment impact assessment study be conducted before operations commence b. The mine will enforce environmental management plan based on the approved Environmental Impact Assessment study

APPENDIX

APPENDIX ONE: ITEMS BE KEPT IN FIRST-AID .

1. The following items are to be kept and maintained in first-aid boxes whose standard dimensions shall be, length 63.5cm, width 38cm and height 12.5cm, and are a minimum requirement:

Splints

Eight splints with metal junctions.

Two rectangular splints for injuries to elbow, forearm, wrist and hand (Recommended size 500mm X 230mm X 75mm)

Tourniquets

Two rubber tourniquets, one for the upper limbs and one for the lower limbs.

Two tourniquet "twisting sticks", one 150mm long, one 230mm long.

Bandages

Eighteen triangular bandages

Twelve sterilized small first-aid packets "finger dressing" size.

Eight sterilized medium first-aid packets "first field dressing" size.

Four sterilized large first-aid packets "shell dressing" size.

Each packet of above dressing to be in waterproof cover with rolled bandage lightly stitched on at back of dressing of gauze and wool 500g tow.

250g packet cotton wool

Twelve assorted safety pins.

Four 30g packets white lint.

One 60ml bottle labelled "Antiseptic - Poison - For External Use Only".

Eye drops, one 30ml dropper bottle sterile liquid paraffin.

One small pair of scissors

The whole of the above splints, tourniquets, bandages and dressings shall be packed in a strong metal box fitted with leather straps and a handle.

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APPENDIX 2

FIRE-FIGHTING EQUIPMENT AND FIRE-EXTINGUISHERS.

1. Suitable fire-fighting equipment means a fully equipped fire-fighting unit capable of extinguishing every type of fire, or where this is not possible or unduly onerous, adequate provision of supplies of water, suitable fire-extinguishers or containers filled with sand or inert dust at places where they are adequate and suitable for the fire risk involved.
2. For the purposes of paragraph 1,"adequate supplies of water" means water sufficient in quantity, supplied at a pressure not less than 3.5 bars, at a rate of not less than two hundred and seventy litres per minute through pipes, hoses and hydrants.
3. For the purposes of this Schedule, fires are classified as follows:

Class "A"

These are fires involving solid materials normally of an organic nature (compounds of carbon), in which combustion generally occurs with the formation of glowing embers. Water in the form of a jet or spray or such other agents as the Director may in writing approve, may be used as suitable fire-extinguishing agents.

Class "B"

These are fires involving liquids or liquefiable solids. For the purpose of choosing effective extinguishing agents inflammable liquids may be divided into two groups:

(i) Those that are miscible with water; and

(ii) Those that are not miscible with water.

Where the fire falls under B (i) the extinguishing agents include water spray, foam, and vaporising liquids; and where the fire falls under B(ii) the extinguishing agents are vaporising liquids, carbon dioxide and dry chemical powders and such other agents as the Director GMD may approve in writing.

Class "C"

These are fires involving gases or liquefied gases in the form of a liquid or gas leak or liquid spillage and these include methane, propane, and butane. Foam or dry chemical powder can be used to control fires involving liquid spills and gas leaks. Water, in the form of spray, may only be used to cool the containers.

Class "D"

These are fires involving metals. Extinguishing agents containing water are ineffective and even dangerous; carbon dioxide and the bicarbonate classes of dry chemical powders may also be hazardous if applied to most metal fires. Powdered graphite, powdered talc, soda ash, limestone and dry sand are normally suitable for Class `D' fires. Special fusing powders may also be

used for fires involving some metals, especially those which are radioactive.

Electrical fires

It is not considered, according to present-day ideas, that electrical fires constitute a class, since any fire involving, or started by, electrical equipment must in fact, be a fire of Class `A',`B' or `D'. The normal procedure in such circumstances is to isolate the electricity and use an extinguishing method appropriate to the substance which is burning. Only when this cannot be done with certainty will special extinguishing agents be required which are non-conductors of electricity and non-damaging to equipment; these are vaporising liquids, dry powders and carbon dioxide and such other agents as the Director may in writing approve, although the cooling and condensation effects of carbon dioxide may affect sensitive electronic equipment.

4. (1) Suitable fire-extinguisher means, a fire-extinguisher designed for use on a fire in its earliest stage and not expected to be effective after a fire has reached large dimensions. Fire-extinguishers differ and each type is limited in application to certain kinds of fire. It is essential that the correct type of fire-extinguisher is used depending on the nature of the source of the fire, according to the international classification of fires quoted.

(2) A Competent person, fully trained and experienced in fire-fighting, shall decide upon the correct type and size of fire-extinguisher to be located at places where an extinguisher is required to be provided according to the provisions of regulation

(3) Fire-extinguishers shall be carefully maintained to ensure instant readiness when required.

APPENDIX 3

COMPETENCY TESTING

a) Harness

b) Blasting ticket

c) Manager Competency ticket

d) Approval of safety helmets, PPE

e) Winders

f) Rock breakers

g) Self-propelled vehicles approval of type or class of self-propelled vehicle for use underground

APPENDIX 4

MAXIMUM PERMITTED QUANTITIES OF CERTAIN GASES

Column 1 Description of gas	Column 2 Maximum permitted quantity of gas in parts per million
1. Carbon dioxide	7 500
2. Carbon monoxide	100
3. Nitrous fumes	10
4. Sulphur dioxide	20
5. Hydrogen sulphide	20

APPENDIX 5

WORKING SHIFT LOG BOOK

APPENDIX 6

PRELIMINARY REPORT FROM

PRELIMINARY INCIDENT REPORT

Subject:

Incident Date:		Mine:	
Incident Time:		Manager:	

1. Description of Incident (with Photo's if possible):

2. Immediate Causes Identified:

3. Key Learning's:

4. Corrective Actions:

APPENDIX 7

ACCIDENT REPORT FROM

ACCIDENT REPORT FORM

This form must be completed for reportable accidents in terms of regulations and dangerous occurrences

SECTION 1:

EMPLOYER DETAILS

1. NAME OF OPERATOR:.....

2. NAME OF MINESITE:.....

3. DISTRICT:.....

4. MINERAL(S) MINED:.....

SECTION B:

ACCIDENT OR DANGEROUS OCCURRENCE DETAILS

1. Mine Accident or Number .....

2. Number of persons killed.....

3. Number of persons totally disabled.....

4. Number of persons injured.....

5. Date of accident or dangerous occurrence.....

6. Time of accident or dangerous occurrence.....

7. Location of accident or dangerous occurrence.....

8. Name of working place.....

9. Depth below surface (in metres).....

10. Description of accident or dangerous occurrence in words

.....

.....

11. Did accident or dangerous occurrence occur during normal working hours or overtime? .....

12. Did accident or happen at normal workplace? Yes☐ No☐

SECTION C:

RESPONSIBLE PERSONS

NAME: .....

IDENTITY NUMBER: .....

OCCUPATION: .....

Name of Manager/Technician Signature

Date

SECTION 2:

FOR USE BY THE REGULATION AND INSPECTION UNIT

1. ACCIDENT OR DANGEROUS OCCURRENCE NUMBER

.....

2. DATE REPORTED.....

3. TYPE OF ACCIDENT OR DANGEROUS OCCURRENCE

.....

4. PROBABLE CAUSE OF ACCIDENT OR DANGEROUS OCCURRENCE .....

5. CONTRAVENTION IN INSPECTOR'S OPINION .....

.....

6. IF YES, ACT/STANDARD CONTRAVENED

7. ACTION RECOMMENDED

8. DATE EVALUATION FORM COMPLETED

INSPECTORATE DETAILS

NAME (IN BLOCK LETTERS):.....

DATE: ...../...../..... SIGNATURE:

10. MINE INSPECTOR: .....

11. DIRECTOR REGULATION AND INSPECTION:

.....

12. ARE CRIMINAL PROCEEDINGS ENVISAGED?

YES☐ NO☐

APPENDIX 8
Risk Assessment
HIERARCHY OF CONTROLS

Elimination	The most satisfactory method of dealing with hazards is to get rid of it. Once the hazard has been eliminated, the potential for harm has gone.
Substitution	This involves substituting a dangerous process or substance with one that is not as dangerous.
Isolation	Separate or isolate the hazard from the people
Engineering	Introduce or substitute an engineered device to eliminate or reduce the risk.
Administrative	Administrative solutions usually involve modification of the likelihood of an accident happening. Do this by reducing the number of people exposed to the hazard, and by ensuring that those who must remain exposed know about the hazard and how best to manage it. Administrative solutions also include danger signs and written systems of work, such as those for working in confined spaces and lock-out procedures.
PPE	Provision of personal protective equipment should only be considered when all other control methods are impractical. They provide a means to increase control, and offer a last line of defence when used with another method higher up the hierarchy.