

Mine Health and Safety Council



MHSC

Guidelines for the South African Small-Scale Mining to Comply with the Mine Health and Safety Act

Draft Guidelines

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Preface (Executive Summary)

Small-scale mining (SSM) is a significant source of income in many developing countries and constitutes an important economic sector in South Africa. The positive impact of occupational health and safety management on productivity, reduction of hazards and risks at work has been widely recognised by Government, employers and workers. Hence, improvements in workplace health and safety can help realize the full potential of SSM. The United States Agency for International Development (USAID) recognized the important contribution small-scale mining makes to developing economies and outlined a preventive strategy for cleaner production for small-scale mining enterprises that in effect entailed implementing health and safety principles to reduce production costs, improve product quality and mitigate risks to workers and the environment (USAID, 2009). It was in recognition of the economic importance of SSM in South Africa and the role effective health and safety management can play in harnessing improvements in this sector, that the Mine Health and Safety Council (MHSC) of South Africa commissioned a study on the development of guidelines to facilitate compliance with the requirements of the amended Mine Health and Safety Act (No 29 of 1996) (MHSA).

Work in SSM is hazardous and high risk and exposes workers to a variety of hazards including rock-dust and fumes from explosives, noise, vibration, extreme temperatures and manual handling source. Research shows that artisanal and small-scale mines do not implement occupational health and safety (OHS) management requirements and therefore have high levels of health and safety risks and accidents source. The fatality rates in these businesses are up to 90 times that of large-scale mines in industrialized countries (Hinton, 2007 cited in IFC and ICMM: Working together-How large-scale mining can engage with artisanal and small-scale miners). Both formal and informal mining, accounts for a large proportion of reported exposure to silica and as a result, they have been implicated in the development of silica-associated diseases such as TB, chronic obstructive pulmonary disease (COPD), and lung cancer (Rees et al, 2011). In addition, SSMs operate in precarious conditions: miners often live in mining camps under unsanitary conditions typified by poor housing, poor sewage systems and unsanitary water sources with a potential to spread diseases, disrupt work and destabilize the communities (USAID, 2009).

Furthermore, women are increasingly employed in mining but lack proper protective clothing and equipment. Consequently, they are exposed to health risks such as silicosis from dust, physical trauma and miscarriages due to work-related stress and injuries, sexual violence and abuse (SIM 13 09 03). These and other related gender-based vulnerabilities indicate a need for specific emphasis on gender-sensitive approaches in the management of health and safety to cater to the specific needs of women in mining.

Education, training, demonstration and surveillance are the key to improving OHS in SSM (ILO, 2001). However, this is hampered by the informal nature of SSM, financial constraints, a generalised lack of technical expertise and limited training within the field. Additionally, lack of awareness and illiteracy represent noteworthy root causes of failure of SSM to implement health and safety and hence the high levels of accidents and diseases (Leilanie, 2012). These disproportionately high rates of non-compliance with health and safety requirements typify the situation in South Africa. Driven by these consistently reported concerns, the Mine Health and Safety Council (MHSC) commissioned research to assess levels of compliance with the requirements of the amended Mine Health and Safety Act (Act No. 29 of 1996) (MHSA) in small mines as part of its Culture Transformation Framework launched in November 2011.

The final reports (Ernst & Young, 2013; Siyemba Mining, 2013; Nebavest, 2013; Business Enterprises at University of Pretoria, 2013) found that, a large percentage of SSM operators did not comply with the MHSA and identified the following shortcomings:

- SSM had inadequate knowledge of the MHSA, lacked knowledge regarding training, legal appointments, occupational health surveillance and sickness/Absence management including keeping of medical records.
- Most operators had lower levels of education, lacked the tool to manage health and safety (a health and safety management system) and were not effective in communicating workplace health and safety messages often punctuated by wrong perceptions of safety such as injuries occurred because workers wanted compensation or that some MHSA requirements needed to be relaxed to increase mining activities which will then benefit the national economy.
- The vast majority lacked the resources to manage health and safety in SSM.

One of the outcomes of the previous studies was a recommendation (as one of the strategies to close the gaps identified) to MHSC that Guidelines be developed for the SSM to assist them to effectively manage workplace health and safety and comply with the requirements of the amended MHSA. However, the MHSA does not explicitly establish a health and safety management system as a tool that employers or mine owners can use to implement the requirements of the Act. Nevertheless we can use the ILO Guidelines (ILO-OSH, 2001) and apply the “Plan-Do-Check-Act” model that is compatible to the guidelines. Unlike (OHSAS18001:2007), the ILO model is free to access and can be easily adapted to the specific nature and size of the mine.

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List of abbreviations

BS	British Standard
CEO	Chief Executive Officer
CoPs	Code of Practices
COPD	Chronic Obstructive Airway Disease
CTAC	Cultural Transformation Advisory Committee
DME	Department of Minerals and Energy
DMR	Department of Mineral Resources
DOL	Department of Labour
DWP	Designated Working Place
ECG	Electrocardiogram
EU	European Union
EWP	Elevating Work Platform
HAV	Hand Arm Vibration
HCP	Hearing Conservation Programme
HIRA	Hazard Identification and Risk Assessment
HIV/AIDS	Human ImmunoDeficiency Virus/Acquired Immune Deficiency Syndrome
HPDs	Hearing Protection Devices
HSE	Health and Safety Executive
Hz	Hertz
ILO	International Labour Organisation
ILO-OSH	International Labour Organization-Occupational Safety and Health
JSA	Job Safety Analysis
LEV	Light Electric Vehicle/Low Emission Vehicle
LEV	Local Exhaust Ventilation
MHSA	Mine Health and Safety Act 1996 (Act No. 29 of 1996)
MHSC	Mine Health and Safety Council

MHSI	Mine Health and Safety Inspectorate
MSDS	Material Safety Data Sheet
MWEP	Mobile Elevated Work Platform
NIHL	Noise Induced Hearing Loss
NSW	New South Wales
OEL	Occupational Exposure Limit
OH	Occupational Health
OHS	Occupational Health and Safety
OHSMS	Occupational Health and Safety Management System
PAHS	Polycyclic Aromatic Hydrocarbons
PPE	Personal Protective Equipment
SABS	South African Bureau of Standards
SAMRASS	South African Mines Reportable Accidents Statistical System
SSM	Small-scale Mining
SSMs	Small-scale Mines
TMM	Trackless Mobile Machine
USAID	United States Agency for International Development
WBV	Whole Body Vibration
WEL	Workplace Exposure Limit

1 SCOPE OF THE GUIDELINES

These guidelines provide direction/guidance on the MHSA requirements for health and safety management in small-scale mining in South Africa. By design, these guidelines are presented in accessible, easy to understand language to ensure meaningful use by small mine owners and employees, and are primarily intended to provide basic tools for managing and promoting workplace health and safety as stipulated within South African Occupational health and safety law. The Guidelines will ensure that the MHSC appropriately implements its own set of recommendations that relate to identifying the needs of: (i) Small-Scale Miners and (ii) the Culture Transformation Framework. Following preliminary need identification, the guidelines will facilitate the development of occupational health and safety management programmes in SSM thereby helping them (SSM) to prevent or reduce the occurrence of workplace injuries and diseases, enhance production and facilitate the achievement of zero harm tolerance in line with the industry's vision of ensuring that every mine worker returns home unharmed every day.

2 OBJECTIVE OF THE GUIDELINES

The objective of these guidelines is to assist South African small mines to implement effective workplace health and safety management to comply with the requirement under Section 2 of the amended MHSA which states that, mine owners should ensure safety at the mines. The guidelines will, in the first instance, help SSM owners, managers and workers to prepare, implement and maintain written health and safety programmes. Furthermore, the guidelines are specifically intended to encourage dialogue between relevant stakeholders in matters relating to workplace health and safety and will also help in promoting positive health and safety culture within the workplace.

3 DEFINITION OF SMALL-SCALE MINING

Small-scale mining is an operation mining a single commodity with a workforce of less than 50 employees (Section 1 (e) (f) and Schedule of National Small Business Amendment Act 2003 (Act No. 26 of 2003).

For the purpose of this guideline, SSMs refer to the micro, very small and medium mining and quarrying operations as classified by the National Small Business Amendment Act, 2003. Table 1 below illustrates the parameters within which small scale mines fall:

Table 1: Classification of mining and quarrying operations

Size	Total full time equivalent of paid full time employees.	Total annual turnover	Total gross asset value (fixed property excluded)
Micro	<5	<R150 000	<R100 000
Very small	<20	<R3m	<R1.8m
Small	<50	<R7.5m	<R4.5m
Medium	<200	<R30m	<R18m

(Source: National Small Business Amendment Act, 2003)

Artisanal mining is comprised of individuals or families who do not have mining rights, and mine plans. These miners sell their product to anybody who turns up to buy it. Others are organised groups operating with mining rights and use advanced methodology, which may involve limited mechanisation. Most mining operations are near surface but there are underground mining with depths of 50 metres or more. Both groups often smuggle

production in order to obtain higher prices and avoid taxes. Various commodities such as gold, diamonds, emeralds and other precious stones, high-grade chromite and carsiterite are mined.

4 INTRODUCTION

4.1 Self-assessment tool: - An explanatory Overview for Small Scale Miners.

This is a self-assessment checklist for employers to complete and determine their current status in health and safety management: how well the mine is progressing in managing health and safety at work. The self-assessment can help the employer or mine owner of SSM to identify gaps or deficiencies in the current management of health and safety or other programmes that are lacking and need to be put in place in order to fully comply with MHSA requirements.

The MHSC understands and commends the important contribution small-scale mining makes to the economy of South Africa. Against a background of limited investment resources, small mine owners have to maintain their equipment to keep them working efficiently as well as pay their workers. In addition, mine owners, being independent employers, must sift through and comply with all the rules and regulations that govern their business including the Mine Health and Safety Act and its regulations. These guidelines are intended to facilitate that task and make it much easier as well as help them manage health and safety properly and successfully.

The occupational health and safety management system is a tool that you should put in place to help you comply with the Mine Health and safety Act No. 29, 1996 and manage the health and safety of people working in your mine as well as the immediate environment where your mine operations take place. The health and safety management system consists of the policy and management plan and procedures that help you protect your employees, contractors, visitors and your property and the environment from damage. It helps you protect yourself from personal liability as a mine owner, employer, manager or supervisor. By putting in place an occupational health and safety management system, you are demonstrating to your employees that you genuinely care about their health and safety by taking measures to reduce injuries and ill-health at work thereby increasing job satisfaction and productivity in your mine.

The MHSA and regulations establish the minimum standards for keeping your mine healthy and safe for work. By complying with these standards, you will also be complying with the law. Remember that the law cannot foresee everything that might or might not happen in your mine but as an employer, it is your duty to know the hazards that are specific to your workplace and the way in which you carry out your operations, assess the risks and identify the ways to control them and communicate the information to your employees.

Whether or not you already have a health and safety management system for your mine, this self-assessment tool will assist you to know where to begin or how well you are progressing in managing health and safety at work and complying with the MHSA and its regulations. The tool will help you determine what is missing and what is not working well and other procedures that you may need to introduce to assist you to comply with the MHSA.

4.1.1 Instructions on how to use the tool

This assessment tool (Table 2) is a guide, exclusively intended to help you assess where you are in terms of the development and implementation of occupational health and safety

management system in your mine. The tool follows the pattern or sequence of MSHA requirements and not a specific health and safety management system or plan.

This exercise requires you to be completely honest. The questions you answer will identify areas where you have more work to do, some of which you may be able to correct with minimal intervention while others may need more time and effort to put in place. Whatever the case, you would be able to determine your priority areas and get your employees involved. There are several questions on each element but each question is rated on a scale that has a range of 1 to 5. You should:

- Pick a rating that best matches your answer
- Add-up your ratings (at the end of the assessment), and compare your result with the table given on completing the assessment.

As you complete the questions, you will have a more accurate assessment of whether you are on track and where you might have some work to do, to align more closely with safety and practice requirements.

Table 2: The self-assessment tool

	QUESTIONS	MSHA Being initiated.		MSHA partially implemented		MSHA fully implemented
		1	2	3	4	5
1	Management Commitment					
1.1	The employer's responsibilities in health and safety have been identified and understood					
1.2	The general duties of the employer in health and safety at the mine have been identified and understood					
1.3	The employer is involved in health and safety by providing visible leadership					
1.4	Senior management attends health and safety committee meetings					
1.5	The employer provides resources in the form of time, people, money and infrastructure to manage health and safety successfully at the mine					
1.6	There is an occupational health and safety policy at the mine and it is understood by everyone					
1.7	Everyone in the mine is accountable for health and safety in their area of responsibility					
2	Occupational Health and Safety Policy					
2.1	There is a written Occupational Health and Safety Policy for the mine					

	QUESTIONS	MHSA Being initiated.		MHSA partially implemented		MHSA fully implemented
		1	2	3	4	5
2.2	Employees or their representatives were consulted when developing the policy					
2.3	The Policy has been signed by the Employee representative and the most senior Manager or CEO of the Mine					
2.4	The Policy has been brought to the knowledge of everyone in the mine and understood					
2.5	The Policy sets goals for the health and safety of all people working at the mine					
3	Management Structure (Organogram)					
3.1	There is a written structure such as in the form of a chart (organogram) to manage health and safety at the mine					
3.2	The Organogram shows clear lines of responsibilities and accountability for managing health and safety at the mine					
3.3	The rights and duties of employees, managers and supervisors in health and safety at the mine have been explained to them and are known					
4	Planning for Health and Safety					
4.1	The management of health and safety at the mine is planned in a systematic way					
4.2	Occupational health and safety objectives are set and implemented					
4.3	There is regular assessment of how well health and safety management is doing at the mine					
4.4	Only competent persons are used in managing health and safety					
4.5	Overall health and safety management is assessed and improvement changes made every year					
4.6	Health and safety information is made available and readily accessible to everyone					
5	Consultation and Communication					
5.1	The employer has identified and requirements for consulting with					

	QUESTIONS	MHSA Being initiated.		MHSA partially implemented		MHSA fully implemented
		1	2	3	4	5
	employees and delivering health and safety information					
5.2	The structures for consultations such as safety representatives and health and safety committee have been set up					
5.3	The employer consulted employees when planning for health and safety management					
5.4	Employees were consulted when preparing the Occupational health and safety policy					
5.5	Employees were consulted when conducting hazard identification and risk assessment of the mine					
5.6	Employees were consulted when making decisions regarding training in health and safety at the mine					
5.7	There is a procedure to inform employees about changes in mine operations					
6	Risk Management					
6.1	The employer has identified and understood MHSA requirements for identifying hazards and eliminating them or reducing their risks in the mine					
6.2	Hazards are identified and the major hazards at the mine listed					
6.3	Signs have been displayed in the mine warning people of those hazards					
6.4	You assess the risks from hazards you have identified					
6.5	Employees are involved in identifying hazards and assessing their risks					
6.6	You prioritise risks to identify those requiring immediate or highest level of action					
6.7	You have identified and assessed special hazards prescribed by MHSA such as fire and explosion, explosives, electricity, noise, etc.					
6.8	There is a procedure for employees to report hazards					
6.9	There is a procedure to break down tasks in order to identify and control risks					

	QUESTIONS	MHSA Being initiated.		MHSA partially implemented		MHSA fully implemented
		1	2	3	4	5
6.10	Workers are involved in this procedure and records of results are kept					
6.11	Risks are eliminated or minimised using the hierarchy of controls prescribed by MHSA					
6.12	Workplaces at the mine are regularly inspected					
6.13	Written checklists have been prepared to be used to carry out these inspections					
6.14	Action plans are prepared and implemented for each inspection					
6.15	Injuries and diseases are reported					
6.16	You investigate injuries and diseases					
7	Work Environment					
7.1	You have identified all the possible hazards of the work environment such as noise, dusts, heat and cold, etc and assessed their risks to your workers					
7.2	You keep records of these assessments and they are available to be viewed					
7.3	You have put in place control measures for these hazards					
7.4	The records of corrective measures are available to be viewed					
7.5	You monitor work environment risk assessments and their controls and keep records					
7.6	You regularly revise work environment risk assessments and controls					
8	Occupational Health Surveillance					
8.1	You have established and maintained a system of workers' health surveillance at the mine for you to test for example their lung capacity and hearing condition					
8.2	You have kept a record of employees who perform work requiring medical surveillance					
8.3	Employee records of medical surveillance are kept confidential					
8.4	You have available medical reports of employees' health compiled by an occupational medical practitioner					

	QUESTIONS	MHSA Being initiated.		MHSA partially implemented		MHSA fully implemented
		1	2	3	4	5
8.5	Pre-employment medical exams are conducted and records are kept					
8.6	Exit medical examinations are conducted and certificates issued to workers whose employment has been terminated					
9	Safe Systems of Work and Work in Confined Spaces					
9.1	You have prepared Codes of practice which are procedures to enable work to be done safely as required by MHSA for tasks involving major risks at the mine					
9.2	The procedures were prepared by a competent person using results of risk assessments					
9.3	You have trained your workers in the use of the codes of practice					
9.4	You consult workers when preparing and revising the procedures					
9.5	You issue permits for high risk work such as confined space entry, high voltage electrical work, hot work, etc.					
9.6	You have introduced procedure to deal with violations of permit rules or codes of practice					
10	Emergency Planning and Evacuation					
10.1	You have identified and made a list of unplanned incidents that could happen at the mine such as fire, explosion, rock fall due to seismic activity and injure people at the mine or its surrounding					
10.2	You have in place procedures to respond to these emergencies					
10.3	You have coordinated your emergency response activities with those of other emergency services in your area					
10.4	You have posted a list of telephone numbers of emergency services at conspicuous places at the mine					
10.5	You have identified the training needs of your employees to prepare them for emergencies at your mine					
10.6	You have trained your workers accordingly					

	QUESTIONS	MHSA Being initiated.		MHSA partially implemented		MHSA fully implemented
		1	2	3	4	5
10.7	You conduct regular emergency evacuation drills to test your preparedness and make corrections if needed					
11	Maintenance of Plant and Work Equipment					
11.1	You have made a written list of all plant and work equipment at the mine					
11.2	You have a programme you have put in document form to routinely inspect, test and maintain your plant and equipment					
11.3	Your programme has been prepared by a qualified and competent person					
11.4	All inspection, testing and maintenance work at your mine is put on record and kept for future reference					
11.5	You schedule and conduct maintenance of your plant and equipment before they breakdown or develop problems					
12	Accident/Incident Reporting and Investigation					
12.1	There is a written procedure detailing how your workers can report an accident, incident or near miss immediately it occurs					
12.2	You inform your workers about those reported cases and those that come to your notice at least once in a month					
12.3	You have in place a written procedure for investigating accidents and incidents that have been reported or come to your notice					
12.3	You involve your workers or their representatives such as members of the health and safety committee and safety representatives in the investigation of accidents and incidents					
12.4	You keep records of all accidents or incidents investigation					
12.5	People working at the mine are informed of the results of the investigation and the actions you					

	QUESTIONS	MHSA Being initiated.		MHSA partially implemented		MHSA fully implemented
		1	2	3	4	5
	have taken to prevent similar accidents or incidents from occurring again					
13	Management of Contractors and Change					
13.1	You have a written list of all the contractors who work at your mine					
13.2	You have in place a procedure for selecting contractors taking into consideration their history and competence in health and safety					
13.3	The procedure indicates how you will manage contractors who come to work at your mine					
13.4	You have in place, a safe work procedure for all work to be undertaken by a contractor					
13.5	All contract workers are given health and safety induction training before they can work at the mine					
13.6	You consult workers or their representatives when you plan to introduce changes in mine operations					
14	Training for Health and Safety					
14.1	You take into consideration the competence and fitness of workers, to their task before you hire them					
14.2	You have a training programme for workers at the mine					
14.3	All workers are included in the training programme					
14.4	You keep all training records					
14.5	All workers receive induction training in health and safety before they commence work at the mine					
14.6	Your workers have been trained in the use of fire-fighting equipment					
14.7	You have trained persons to give first aid					
14.8	You have trained all your workers on the emergency procedures at the mine					
15	Fitness for Work, Welfare Facilities					
15.1	There is a programme in place to ensure that workers are fit for work at the mine					
15.2	You have a policy in place to					

	QUESTIONS	MHSA Being initiated.		MHSA partially implemented		MHSA fully implemented
		1	2	3	4	5
	prevent workplace violence and harassment					
15.3	You have trained workers how to protect themselves from violence and aggression					
15.4	You have a policy in place to prevent alcohol and drug abuse at the mine					
15.5	You have provided your workers training on the alcohol and drug abuse policy					
15.6	You hold toolbox talks and safety meetings with workers to discuss issues about their safety and welfare					
15.7	You provide separate welfare facilities such as toilets, washrooms, change rooms and lockers for female and male workers at the mine					
16	Documentation and Registers					
16.1	You have a documentation system in place to keep all health and safety records					
16.2	You keep a register of all legislation including MHSA and Regulations, Codes of practice and guidelines					
16.3	You have in place a procedure to enable you update the register when new information such as amendments to MHSA is available					
16.4	You have a register that indicates the names of employees that have been given an opportunity to read key legislation and procedure documents including MHSA and regulations, codes of practice documentation.					
16.5	You have in place a procedure to control the way you issue and revise documents					
16.6	You have a procedure of removing documents that are too old and not useful from your document system					
17	Total your score for each level					
18	Grand total					

Thank you for taking time to complete this self-assessment which will protect yourself and your employees from preventable unsafe practices. Now, please check where you are in the management of health and safety at your mine using the Rating table for compliance with

the MSHA (on Table 3 below). Add up your total score for all questions and check in which range your total falls to know where you are in implementing MSHA requirements. If you need more work to meet the requirements, you should prepare and implement an action plan to put in place those elements that are missing or improve those areas where your mine is not doing particularly well. Remember, being in the lower range should not discourage you because you are already doing something for the health and safety of your workers and with greater efforts you will succeed in establishing a proper health and safety management system and comply with MSHA.

Table 3: Rating table for compliance with the MSHA

Total	1-212	213-424	425-530
Rate yourself (where you are currently)	<ul style="list-style-type: none"> You have some health and safety procedures but are just starting. Involve your workers in developing your health and safety management programme. 	<ul style="list-style-type: none"> You have partially implemented health and safety requirements. Involve your workers to draw up a plan of action to put in place the elements lacking. 	<ul style="list-style-type: none"> You are fully implementing health and safety requirements and you should monitor and periodically review to improve your system.

4.2 Overview of the Occupational Health and Safety Management System

What an occupational health and safety management system (OHSMS) means and how it can help you?

The number of fatalities, lost-time injuries and illnesses that occur in South African mining every year bring enormous financial burden on mine owners including substantial losses to those workers harmed, their families, friends and co-workers. Surely, this is sufficient reason for employers to be more determined and devote greater efforts to take charge of the health and safety of their workforce, improve ways to prevent or reduce the human costs of accidents, illnesses and diseases in mining. As an employer you can do this by putting in place a health and safety management system (OHSMS), which is an effective tool for managing health and safety at work thereby helping you meet your obligations under the MSHA and regulations.

Mining is your business and your goal is to make that business successful by producing quality products that yield maximum financial reward. To achieve this objective, you need to manage the productivity of your business and this critically includes the health and safety of your workforce-the people who work for you to make things happen. Managing the health and safety of your workers as part of your business processes is essential as it affects production, product quality and your financial results.

An OHSMS provides a framework and structure for you to systematically plan, develop, implement and maintain or revise the health and safety plans and processes required to manage health and safety at work. This section of the guidelines provides you with a simple understanding of OHSMS as part of the overall management system. This will support you with: - (i) clarifying the organisational structure; (ii) planning activities; (iii) clarifying responsibilities; (iv) improving practices; (v) streamlining procedures, processes and (vi) managing resources for developing, implementing, achieving, reviewing and maintaining

your occupational health and safety policy, in order to better manage the hazards and risks associated with your business.

The **Occupational health and Safety Management System** helps you to identify all hazards and risks to be managed, provide guidelines or procedures for how to manage the risks, assigns responsibilities for implementing actions, allocates the time, money, facilities and the people required to carry out these roles successfully and determines the level of training required to properly implement the plans. The OHSMS also identifies the arrangements you need to make in order to monitor and review the system to keep it working well and constantly improved as an ongoing process.

The **Occupational health and Safety Management System** you put in place should combine the working environment, equipment, systems and procedures and the people working for you in one body of elements all interacting with each other. The system will determine how successful you will be in managing health and safety in your workplace. If you put together an orderly and complete system to manage health and safety, then you and your workers will find it easier to follow and introduce further improvements when the need arises.

In simple terms, your **Occupational health and Safety Management System** is a framework that allows you to consistently identify and control health and safety risks at your mine, reduce the potential for accidents, help achieve compliance with health and safety legislation including MHSa and regulations and continually improve performance.

The MHSa does not explicitly specify a model **Occupational health and Safety Management System** which employers should implement at their mines or workplaces. However, MHSa requires you, as an employer, to have the right arrangements at your workplace to manage the health and safety of the people who work for you. The following models of **Occupational health and Safety Management System** are being applied in different countries:

- HSG 65 Managing for Health and Safety applied in the United Kingdom of Great Britain.
- British Standard BS OHSAS 18001: 2007 revised 2015 Occupational Health and Safety Assessment Series used by mostly large-scale companies in several countries across the world, for example the Anglo American Mining group in South Africa.
- ILO-OSH 2001 Guidelines on Occupational Safety and Health Management Systems developed by the International Labour Organisation (a specialised agency of the United Nations Organisation) and used throughout the world.

These systems are based on the basic systematic management model Plan-Do-Check-Act embodying the principle of continual improvement of health and safety performance at work.

Features of the Occupational health and Safety Management System (OHSMS): getting to know some important qualities of an OHSMS that is working well

- All aspects of the design and operations of your workplace affect occupational health and safety.
- The system is based on the nature of the hazards and risks at your mine.
- The design and management of the health and safety system should promote the integration of environment, people and systems, in proportions that reflect the size and nature of your organisation and not one-size-fits-all.

- Health and safety is a management function and will require your extensive commitment and the involvement of your senior management.
- You define responsibilities and accountabilities for occupational health and safety activities for all levels or departments at the mine.
- Incidents, injuries and work-related illnesses are not simply a manifestation of human error; they indicate a problem in the health and safety management system you are implementing.
- Performance goals or targets reflect the objectives set by management and are at the heart of the **Occupational health and Safety Management System**.
- All the people working for you need to be competent for the work they are doing. Your **Occupational health and Safety Management System** should therefore contain procedures for training them to ensure they are competent to do their job in a safe manner without endangering themselves, fellow workers or visitors.
- As an employer, **Occupational health and Safety Management System** is a demonstration of the acceptance of your legal responsibility for the health and safety of your workforce and hence their wellbeing.
- The **Occupational health and Safety Management System** manages your compliance to the requirements of MHSR and regulations. To what extent you are complying will therefore depend on how well your **Occupational health and Safety Management System** is functioning.

ILO-OSH 2001 Guidelines on Occupational Safety and Health Management Systems

The section that follows provides a simplified model of the ILO-OSH 2001 Guidelines on Occupational Safety and Health Management Systems, which you can use to plan, develop, implement and maintain your own workplace health and safety management system. The section also explains the underlying principles of an **Occupational health and Safety Management System** and how you can apply Plan-Do-Check-Act to systematically manage workplace health and safety.

Why you should adopt an Occupational health and Safety Management System model such as ILO-OSH 2001?

ILO is a tripartite UN Agency that influences the development of labour law and occupational health and safety in the world. ILO publications and guidance in occupational health and safety are authoritative including ILO-OSH 2001 model for managing health and safety at work. ILO-OSH 2001 was developed by ILO from an assessment of over 200 health and safety management systems operating in countries all over the world and has gained recognition as an international model. In addition:

- South Africa has endorsed these and is implementing ILO Conventions and standards in occupational health and safety (Convention on Occupational Safety and Health No. 155, Convention on Occupational Health Services No. 161; Convention on Safety and health in mines No. 176, etc.).
- ILO is a tripartite organisation and the views of governments, employers and trade unions representing your employees are reflected in its conventions and standards during the development and adoption process.
- Note: the Chinese Government has adopted ILO-OSH 2001 guidelines and used them to develop a certification framework, which is now being implemented in the country.
- You will not have to pay any proprietary fees nor obtain certification for using the system.
- It is easy to follow.

- Tripartite Consultation is core to the development of ILO Standards and it is effectively practised in South Africa. For example, the DME Tripartite Advisory Council bringing together Government, Employers and Employees representatives has power to define training competencies and advise the Minister on legislative reforms including Occupational health and safety reforms.
- You can measure or assess how well you are doing and also compare (benchmark) your performance with that of other mine businesses like yours.
- You can continuously improve your performance results year after year.
- Other mines or Government can recognise you for your achievements in health and safety management.

Understanding the components of ILO-OSH 2001 OHSMS model

ILO-OSH 2001 is based on a continuous improvement cycle and includes the elements Policy, Organising, Planning and implementation, Evaluation and Action for improvement. The model is presented as a five stage process supported by a system audit-requirement to identify opportunities for improving the system so that it works well and you achieve better results. The elements of the ILO-OSH 2001 model and the way in which they are linked together are shown in the diagram below (Figure 1) and a brief explanation of these elements and the underlying principles follow.

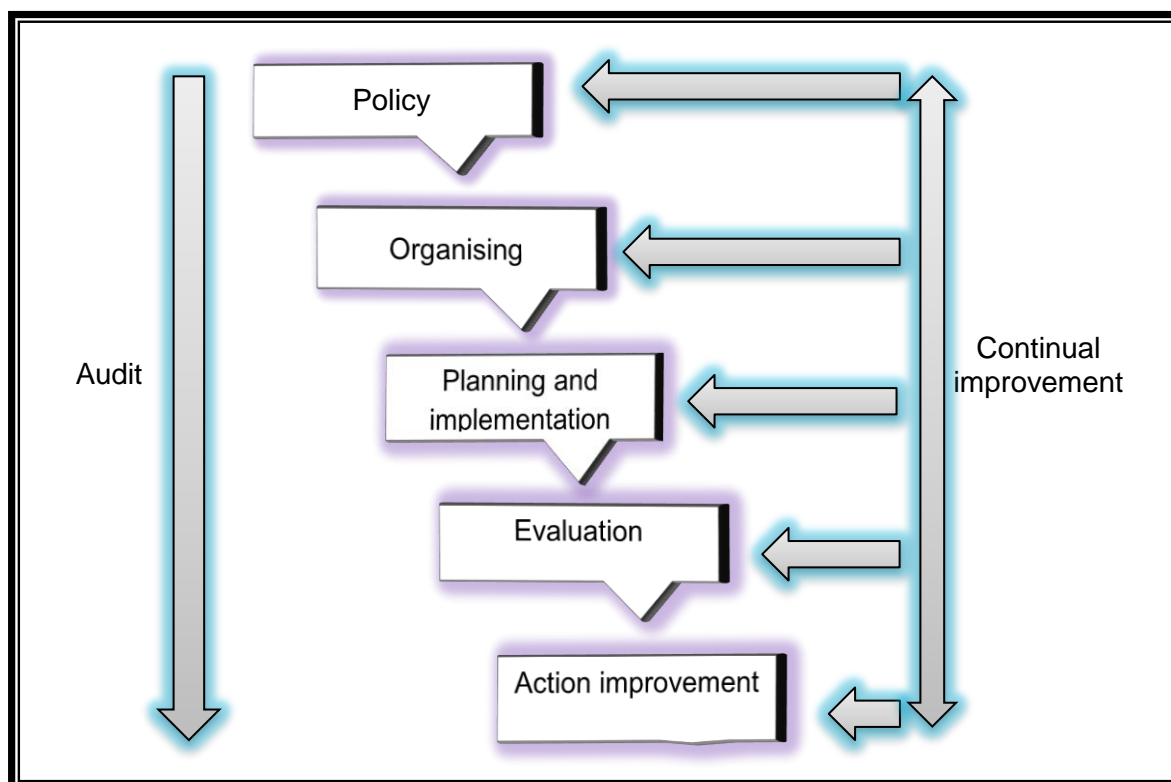


Figure 1: Flow chart based on ILO-OSH 2001
(Adapted from IOSH 2014)

POLICY

Policy element of ILO-OSH 2001 deals with two essential components of your **Occupational health and Safety Management System**:- the general health and safety policy and worker participation. To develop a health and safety management system, first you need to adopt a Health and Safety Policy which will serve as a statement of your employer commitment to

the health and safety of the people who work for you and includes your vision of where you want to be or achieve going forward. This document provides the framework that spells out who is responsible and accountable for health and safety and is signed by senior management and representative of employees. Senior management provides the resources and leadership for implementing the policy to achieve its goals.

PARTICIPATION

Participation is an important part of occupational health and safety management in the workplace. Besides being a MSHA requirement, participation of workers in health and safety matters is effective in achieving better results in health and safety performance.

- **Benefits of worker participation in health and safety management at work**

Workers, either directly or through their representatives, can contribute to continuous improvement in workplace health and safety by:

- Raising concerns.
- Generating new ideas.
- Participating in the development of systems and procedures.
- Participating in the implementation, monitoring and review of the occupational health and safety management system.

Directors set the overall tone for participation by holding management accountable for ensuring workers are involved and consulted in matters concerning their health and safety at work.

What you need to do to ensure workers participate effectively in health and safety management?

As you will see in other sections of these guidelines, it is a MSHA requirement that workers must participate in matters affecting their health and safety. To make this work at your mine, you need to:

- Recognise that the people who work for you have a right to a healthy and safe working environment.
- Recognise the right of health and safety representatives and have them elected and installed.
- Set up a health and safety committee where required and determine their health and safety functions.
- Provide the committee time and resources to participate actively in all your health and safety management processes.
- Initiate and promote the continuation of mutually beneficial two-way communication systems which link management and workers to encourage cooperation. You can use formal or informal communication channels to allow your workers to report their concerns and provide useful suggestions that make your health and safety management system work well.

ORGANISING

The purpose of the organising element is for the employer to define and establish the formal relationships among people and allocate resources for the management of health and safety to achieve objectives. The following matters are covered at the organising stage in the development of the **Occupational health and Safety Management System** :

- The employer establishes the organisational structure to manage health and safety in the workplace usually in the form of a chart or organogram showing the occupational health and safety responsibilities and clear lines of accountability and delegation of powers from top management down to the employees.
- An adequate budget is set aside to put the policy into practice. The budget should however correspond with the size and nature of the organisation.
- Meet MHSA requirements by appointing a senior manager to oversee the proper implementation of the **Occupational health and Safety Management System**.
- Determine ways to communicate occupational health and safety messages both internally and externally ranging from basic information to policies, work procedures and details of the **Occupational health and Safety Management System** itself from managers to workers and other stakeholders and vice versa, making a two-way communication system.
- Determine ways in which you will consult your stakeholders including employees, clients, suppliers, the Regulator, Trade unions and neighbours. Consultation is an effective means of gaining access to the wealth of knowledge and expertise relevant stakeholders have on the hazards and risks in your work place and can offer direction and solutions for improvement. Consultation is a MHSA requirement and will be dealt with elsewhere but you will need to ensure that health and safety representatives are elected and where required the health and safety committee set up with their functions clearly defined and resources and training provided to enable them carry out their duties properly.
- Identify competencies required for your employees at all levels and make arrangements to provide them the necessary training.

PLANNING AND IMPLEMENTATION

The wellbeing of your workforce is important for your business and you want to know where you should be in your efforts to ensure that they work in a safe and healthy environment. The initial assessment tool completed at the beginning of these guidelines (page 19) may have given you some help. The planning and implementation element of the ILO-OSH 2001 model helps you determine in advance what you want to accomplish in the management of health and safety at work and how you want to go about doing so.

Planning

The planning stage will help you develop the objectives of your health and safety management system and to do this you need to take the following steps:

- Start by carrying out an initial assessment of your current status in the management of health and safety at your mine. This checks the arrangements you already have in place and tells you where you are now.
- Identify and select a competent person or an expert in occupational health and safety to identify the hazards in your mine and assess their risks. This will help you establish a risk profile of your mine showing the order of their importance: which ones you need to control first and also create a baseline for managing risks at the mine.
- Set objectives and targets to eliminate or reduce the risks and define the performance criteria and the indicators you will use when assessing whether your objectives are being achieved.
- Collate all the laws and regulations including Guidance materials that apply to your business including the MHSA and Regulations, MDE Guidelines and guidance notes and practice procedures from similar mines. These will help you ensure the health and safety management system you are putting in place meets legal requirements.

- Develop a health and safety plan, which determines how your objectives will be realised. You need to allocate responsibilities to carry out your health and safety policy and make arrangements for those responsibilities to be executed. These are contained in your health and safety plan which sets out what you intend to be achieved (objectives), who is responsible and the time-scale for implementation. Briefly, this is what your health and safety plan should contain:
 - A list of the responsibilities for managing health and safety by all persons involved in operations.
 - List of the hazards and results of the risk assessments.
 - The control measures including safe work procedures and procedures to monitor compliance with safety specified procedures.
 - Plans to deal with emergencies that may occur at the mine.
 - Provision for training staff to oversee implementation.
 - Procedures to help you monitor and assess staff work in implementing the plan.

Implementation

Once you have developed and adopted your health and safety management plans, you need to put them into practice – you need to implement them in order to achieve the desired objectives. Implementation requires a sufficient and good control system of procedures to ensure that people work according to the plans. Implement the plans by:

- Putting into practice, your health and safety risk management process by identifying hazards and assessing the risks to workers on an on-going basis.
- Determining and executing operational procedures to control the risks and also meet legal and internal requirements.
- Motivating the people working for you by rewarding good performance and sanctioning poor performance when necessary. Reinforcing positive behaviour will help you in promoting a positive health and safety culture that is crucial for risk control in your workplace.
- Providing proper supervision of employees to ensure plans and policies are implemented properly.
- Providing adequate training to everyone to ensure that they are competent to do their work.
- Preparing and keeping proper documentation to help you record and monitor progress in implementing your health and safety policy and plan. Make sure you have a document control system.
- Consulting and communicating with employees, for example holding toolbox talks, attending health and safety committee meetings and using committee recommendations to improve your systems, providing suggestion boxes to receive employee views, etc.
- Executing your emergency response plans in order to reduce the impact of emergencies.

EVALUATION

Evaluation of your occupational health and safety management system requires you to check or measure the performance of the whole system or its elements to know whether it is working well and identify the areas where you need to make improvements. This enables you to correct weaknesses and keep your system working well and achieving better results. It is only possible for you to assess or measure how you are performing in health and safety if you set indicators or standards in advance against which you will measure and compare

your results. Examples of indicators are: number of lost-time injuries per month; number of plant breakdowns per week.

What you need do to assess your occupational health and safety management system or its elements?

- Perform active monitoring by checking your performance before problems such as accidents, fires, plant breakdown or explosion occur. For example, inspect premises, examine plant and equipment at planned intervals to ensure they are in good working condition and carry out maintenance if problems are found rather than wait until your plant completely breaks down; Offer a service to assess the health of your workers who are exposed to dusts or excessive noise to check early signs of lung disease or hearing loss and take preventive measures; observe the health and safety behaviour of the people working for you and you can use the results for individual appraisal to determine career advancement and reward positive behaviour, for example when you want to promote managers or supervisors.
- Perform reactive monitoring activities by checking failures of your risk control systems. For example, investigate accidents/incidents, near misses and cases of ill health to identify the root causes and introduce corrections so they do not occur again.
- Get a competent person or a health and safety expert to develop tools such as checklists to use in carrying out inspections or conduct risk assessments.
- Perform a management review by using the results you obtained from active and reactive monitoring to assess whether the way you have designed your management system and the resources you provided to implement it are adequate and the system is working well. Make corrections where necessary.
- Use the same results to check whether you are complying with MHSA and regulatory requirements including your own management system procedures. Make the necessary corrections.

AUDIT

Audit processes are central across all the stages in the ILO-OSH 2001 model. You are required to establish periodic audits in addition to active and reactive monitoring of the entire health and safety management system or any of its elements. Audits help you determine whether the system or its elements are in place and are adequate and working well in preventing accidents and protecting your workers successfully. The results obtained from audits are carried-over through to the Action for Improvement Stage where all the evaluation results are used to identify weakness or opportunities to improve the system at all levels right up to POLICY as well as to find effective solutions to prevent failures in the future and ensure continual improvement.

Actions you need to take to implement audits

You need to develop and adopt an audit policy and programme which enables you to:

- Appoint an auditor who will conduct health and safety audits at the mine periodically, specify the auditor's competence, the scope of audits, frequency, methodology and reporting.
- Provide resources to the auditor to enable audit work to be done successfully.
- Take the necessary action on audit reports by preparing a plan for the improvements recommended and implementing the plan.
- Ensure that information on the conclusions of the audit is feedback to the other stages to improve the health and safety management system.

ACTION (S) FOR IMPROVEMENT

This stage helps you to identify opportunities for preventing accidents and ill health within your mine. This stage addresses two aspects:

- Preventive and corrective action
- Action for continual improvement

Preventive and corrective action

Prevention and corrective action requires you to systematically analyze and identify the root causes of any weaknesses or failures to comply with the requirements of MSHA and regulations including your own system arrangements (non-conformities). When conducting the analysis, you must use the lessons learned from active and reactive monitoring, audits and management review at the evaluation stage. These analyses should help you identify solutions for correcting the weaknesses in your health and safety management system and for preventing future failures.

Continual improvement

Continual improvement is your commitment to deploying every effort to prevent risks before accidents or ill-health occur and is crucial for achieving better results while requiring less resources. It is much more costly for you to start making changes once an accident has occurred. Remember that one fatal accident can mean the end of your business.

Continual improvement means that you can improve some parts of your health and safety management system at any one time rather than trying to improve all elements simultaneously. This is a structured and practical method that allows you to use audit and monitoring results to constantly and consistently identify opportunities for improvement and overhaul areas of your system that are not doing well.

What continual improvement process can do for you?

The continual improvement process can:

- Identify areas in the mine's health and safety systems where improvements are needed.
- Show you the problems that are negatively affecting the effective operation of your health and safety management system.
- Enable you to draw up action plans to correct identified problems and put them into practice.
- Show you whether your action plans are working well.
- Ensure that you make and keep a record of all the work done after the improvements were made so that.
- You can check whether what you are achieving is in line with your expectations.

4.2.1 A basic understanding of the main principles of the ILO-OSH 2001 model

Whatever **Occupational health and Safety Management System** you adopt including ILO-OSH 2001, has fundamental principles or standards that apply and which you should follow in order to establish a system that will work well and achieve your goals. These principles include:

- **Management commitment**

Management commitment to achieve high standards of health and safety performance through the effective management of health and safety at work.

- **Employee cooperation and participation**

Developing and implementing an effective mechanism for consulting and involving workers in managing health and safety at work.

- **Competence and training**

Organising and delivering effective training to ensure employees are competent to carry out their responsibilities and work in a safe manner and reduce the risk of injury and ill-health at work.

Systematic approach and planning

A systematic planning process and approach is used to develop, implement and maintain the **Occupational health and Safety Management System** that will improve workers' health and safety on a continual basis.

Management commitment

What the Law says?

Section 2 of the MHSWA states that the employer should ensure as far as is reasonably practicable a safe and healthy work environment where employees perform their work without endangering the health and safety of themselves or of any other person.

The standard in health and safety is that the management of the mine must be committed to achieving the highest standards of performance through the effective management of health and safety at work. Research findings show that most injuries or incidents (85%) at work occur as a result of factors that are only controlled by the management of the organisation. Remember that your workers tend to do only what you tell them is important and therefore will work safely if you reinforce that working safely is your priority and of utmost importance to the success of your operations. Research has also found a link between a company's health and safety performance and its productivity and quality of products. This stresses the need for the employer or owner of the mine to show visible and solid commitment to the management of health and safety at work.

What is management commitment?

Management commitment to the health and safety of its workforce is:

- The clear and meaningful declaration by senior management of the mine or the mine owner that at the highest level the company will be involved in and committed toward a healthy and safe working environment for its workers.
- A clear and meaningful declaration that the company considers its workers as its primary source of wealth and therefore will ensure that their health and safety is integrated into decision-making and all business operations so as to achieve the health and safety targets set by the company.

How can you demonstrate a solid management commitment?

- Acknowledge responsibility for the health and safety of the people who work for you and, in consultation with them, develop and put into effect a health and safety policy which sets down the company's intent and vision for the health and safety of the workers and communicate the policy to all stakeholders.
- As an employer, demonstrate that you care for the wellbeing of all persons on site including employees, contractors, and visitors by explicitly recognising their right to a safe working environment.
- Provide money, time, facilities and people needed to implement and maintain the health and safety management system at the mine.
- Senior management should drive health and safety and provide the necessary leadership to show that health and safety is taken seriously by being actively involved in health and safety management. For example, senior management participates actively at health and safety committee meetings, the Director or General Manager conduct walk-through inspections and wear PPE where required (leading by example).
- Appoint a manager and put in place a structure to manage workplace health and safety and assign responsibilities through job descriptions and specification of clear lines of accountability and delegation of duties.
- Make arrangements for consulting workers in health and safety matters and promote cooperation between the employer and the workforce. For example, set up health and safety representatives and health and safety committee where required.
- Hire or train sufficient competent persons to assist in the management of health and safety at the mine; provide appropriate information and training in health and safety to everyone at work.
- Keep records of all health and safety matters so they can be used to check performance levels, compliance with MHSR requirements and learn lessons to improve health and safety as an on-going process.
- Recognise the important principle of continuous improvement in health and safety by making consistent and on-going efforts to prevent accidents and work-related illnesses.

Some basic principles of Leadership in health and safety management that can help you:

- The Board of Directors provides leadership and the policy that sets the direction for the company's management of health and safety at work.
- The Directors encourage a positive health and safety culture by showing active commitment to health and safety supported by consistent behaviour that is in line with company goals, values and beliefs.
- Directors provide informed leadership being aware of the hazards and risks at the site and the control systems for those risks. In this way they will be able to identify where the company is not doing well in health and safety performance. In addition, Directors should know how to measure performance to the extent of seeking advice from industry or health and safety specialists so that they are able to determine whether the systems in place are effective in achieving identified objectives.
- Directors lead by example. They engage with managers and workers by visiting worksites, conducting walk-through inspections to enhance discussion about health and safety thereby improving their knowledge of and performance in health and safety at work.

Principle of cooperation and participation

What the MSHA says?

Section 25 (Chapter 3) of the MSHA states the requirements for Worker participation either individually or through their representatives in the management of health and safety at the mine: Every mine with 20 or more employees must have a health and safety representative for each shift at each designated workplace; every mine with 100 or more employees must have one or more health and safety committees.

Cooperation between the employer and employees is essential in ensuring that the management of health and safety at work is effective. If employees do not cooperate, the health and safety targets you have set in fulfilment of your responsibilities under MSHA as an employer cannot be met. It is therefore necessary for you to make appropriate arrangements to encourage your workforce to actively participate in the management of workplace health and safety. For example, ensure that health and safety representatives are elected and health and safety committee set up where required and that their functions are clearly defined and information, training and resources provided for them to carry out their activities successfully. Once you have installed these structures, make sure that you consult them when making decisions on matters affecting their health and safety.

Remember, worker participation in the management of health and safety at your mine makes your health and safety management work well. It is a requirement of MSHA. An active participation of workers in matters concerning their health and safety helps to promote a positive health and safety culture in your organisation thereby making health and safety everyone's business.

Participation means workers' direct involvement in planning, implementing and maintaining your health and safety management system. Participation also implies that management consults workers throughout the entire health and safety management process.

Why workers should participate in health and safety management?

- It is a legal requirement (Chapter 3 of the MSHA).
- Workers are the backbone of the entire production process and their cooperation is needed for anything to work well; productivity and quality very much depends on the health and motivation of the workers and therefore operations will only run smoothly if practical consideration is given to the protection of the health and safety of the workers.
- Workers are on the shop floor doing the work and are thus exposed to the hazards of the work. This means that health and safety matters directly affect their wellbeing and they need to be informed, trained and consulted in matters concerning their health and safety.
- Workers have direct experience of their work, know the hazards and risks and can suggest better ways of preventing or reducing the risks.
- Workers can identify new hazards and propose control solutions that work well.

How do you know employees are effectively involved in the management of health and safety?

- Employee involvement is recognised as indispensable for establishing and maintaining effective health and safety at work.
- The company makes respect for safety principles, standards and procedures a condition for employment.

- Your workers are allowed to challenge any unsafe acts they see or perceive.
- Your workers can put a task on hold or refuse work if they judge that safety is not adequate until a competent person has taken appropriate control measures to eliminate or minimise the risk.
- Workers understand that they are responsible for working in a safe manner so as to prevent injury to themselves, fellow workers and other persons.
- Workers are actively involved in all programmes put in place to improve health and safety performance at work.

Continuous improvement principle

Practical things you can do to apply the principle of continuous improvement explained in the previous section

First, remember that you can apply the principle of continuous improvement on any element or aspect of your occupational health and safety management system.

Ways you can enhance continual improvement in the management of health and safety at work

You can strengthen your efforts to continually improve your health and safety management system if you:

- Make consistent and on-going efforts to maintain reductions in accidents and lost days on a level that you can sustain by setting targets and working towards meeting them.
- You use your own specialists or hire from outside or create small groups or committees consisting of worker(s), engineer, Manager, supervisor to develop and improve your standards as well as implement improvement initiatives in a systematic or orderly way. They can help you establish indicators for measuring your health and safety performance.
- Constantly involve your workers and their representatives in health and safety matters by communicating to them good practice solutions you have learnt from similar mining operations to help them achieve continuous improvement of your performance.
- Direct consistent efforts towards the detection of potential risks of injury or ill-health and take correct action to prevent them early before they occur.
- If necessary, seek advice from health and safety specialists on your plant and equipment safety including operations and they can also provide you expert support on how to meet your MHSa and regulatory obligations regarding health and safety at the mine.
- People operating your systems are an important source of improvement ideas and you need to encourage them to express them by making sure you motivate and reward them for good safety behaviour and performance.

How do you know you are making progress in continual improvement?

You know you are making progress in continually improving your system if you are:

- Achieving better results every year. For example, you are recording consistently falling rates of injuries, ill-health and sickness absences as well as less damage to property, equipment and the environment.

- Recording steady and improved results achieved with fewer resources because of improvement in the management system itself and a better targeting of efforts.
- Have achieved a breakthrough performance whereby the organisation attains results that propels its culture forward to a new state of efficiency and effectiveness.
- Attaining improvements in the management system itself so that it is more complete, easier to understand or always better than before.

How you can achieve continual improvements?

You can make improvements in the management of health and safety in your workplace by using suggestions derived from:

- Audit results of your health and safety management system.
- Statistics reports published by DME, Department of Labour, etc.
- Good practice results or benchmarks from similar organisations.
- Industry or Sector guidelines such as DME guidance notes and Guidelines for the development of mandatory codes of practice.
- The people in the organisation who are the real fertile source of ideas for improvement.

People who operate your systems are a fertile source of improvement ideas provided you encourage them to express them, for example:

- Managers, team leaders, workers and their representatives usually have many ideas for improvement that can make the process more efficient or much easier to operate and more effective by producing the results you desire.
- People who work for you should feel they own the work processes and are actively monitoring them.
- To achieve improvements, involving your workforce is crucial. You can create groups that include worker, team leader, engineer and manager (diagonal slice group) to work as an improvement team.
- You can achieve good results if directors, managers, team leaders and the entire workforce see health and safety issues as their responsibility.
- Make sure you put in place a procedure to gather and assess improvement ideas. Give feedback to those making suggestions and implement the suggestions that the assessment shows will add value to your OHSMS. Remember that improvement suggestions should support your long-term strategic health and safety goals.
- You can use formal procedures e.g. action plans and task groups to review specific issues.

Competence and training principle

What the MHSa says?

The knowledge, skills, experience and attitudes of your workforce determine their ability to work safely without risk to their own health and safety and of others that may be present in the workplace and to ensure that there are fewer injuries and ill-health arising from their work. The MHSa says in Section 7 that you must consider an employee's training and capabilities before you assign a task to that employee. Hence, as the employer, it is your responsibility to clearly define the health and safety competences at your mine and make the necessary arrangements for all people that work for you to be competent enough to carry out the health and safety aspects of their job effectively.

You need to identify the health and safety competences for everyone in your organisation which satisfies the requirements of the MHSA and its regulations. You can do this by conducting an assessment of the occupational health and safety training needs of all the people working for you, then plan and develop the training programme and implement it. The MHSA requires employers at mines to provide an effective and timely initial occupational health and safety training, for example an induction health and safety training, to all new workers, workers transferring to new jobs or returning to work after a long period of absence from work.

The health and safety representatives and health and safety committee set up at your mine to assist in the management of health and safety and other persons working at the mine can only do their work well if they have sufficient knowledge of occupational health and safety, their specific responsibilities and authority in the management of health and safety at your mine. As the employer or owner of the business, it is your responsibility to provide them sufficient training so that they are able to perform their roles effectively and you can record good results in reducing accidents and ill-health at work. Incorporate their health and safety roles in their job descriptions; develop concrete training programme for them, provide the resources to implement the programme.

Systematic approach principle

If you wish to adopt or are already using any of the occupational health and safety management systems including the ILO-OSH 2001 which form the basis of these guidelines, that system will allow you to use the Plan-Do-Check-Act management model to systematically:

- Set and write down your health and safety objectives and make plans of how you will achieve them.
- Decide who will be responsible and accountable for getting things done, document and communicate this to everyone involved in the organisation so they understand their roles and responsibilities and what is expected of them.
- Provide everyone responsible the resources and skills to be able to carry out their duties in health and safety and to work in a safe manner.
- Involve the people who work for you in all steps you take in planning, implementing and maintaining your health and safety management system including all its elements.
- Check regularly to see whether your health and safety objectives or targets are being met so that you can act to correct the things that are not working well or add those that are needed, strengthen your successes thereby constantly improving your performance in health and safety as an ongoing process.

Use of systematic approach

- Use Plan-Do-Check-Act management model to plan, develop, implement and maintain the occupational health and safety management system. This is explained in more detail in the next section of these guidelines.
- Conduct systematic risk assessments to detect potential accidents and health risks early and prevent injuries and ill-health at work.
- Investigate and document accidents, incidents and illnesses arising from work so that the information can be used to compare figures and measure how well you are doing in managing health and safety at work.
- Use results you obtain from measuring your performance in health and safety to identify and set new health and safety targets and in turn monitor how well you achieve them.

Example: Your target could be: To achieve a rate of 5 reportable accidents per million hours worked by the year 2020

A systematic way of working towards this target will require that:

- Managers, supervisors, safety specialists and occupational health practitioners, workers at the mine all work to achieve this goal. They are committed to reaching this target at all levels of the company.
- Quarterly reports on the goal achievement are made and communicated to everyone.
- Health and safety as well as production processes are consistently reviewed and improved to perform better.

A systematic occupational health and safety management enables you to:

- Place workplace health and safety and the wellbeing of your workers as a top priority.
- Comply with MHSa and regulations to ensure a healthy and safe work environment.

Evidence occupational health and safety measures are having a positive effect include:

- Consistent and significant decrease in the total number of accidents and lost days.
- Steep decline in accident rate over specific time span.
- Increase in the number of workforce during the same period.
- Substantial decline in lost-days over specified periods.

4.2.2 How to develop your occupational health and safety management system using the Plan-Do-Check-Act systematic management model

The Plan-Do-Check-Act management model (figure 2) is a systematic way of applying the occupational health and safety system elements we described in the previous sections.

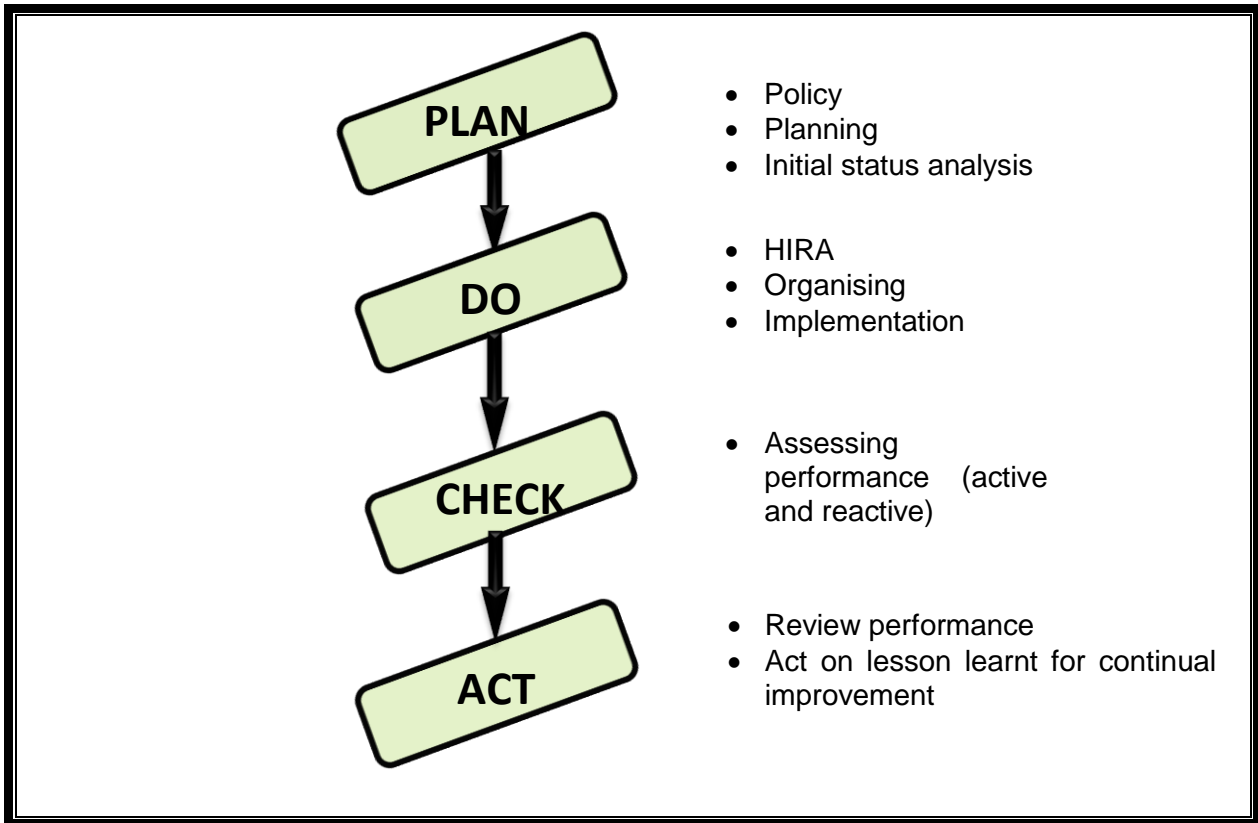


Figure 2: Plan-Do-Check-Act Management Model

(Adapted from IOSH 2014)

PLAN

As an employer you should put in place effective health and safety policies setting a clear direction the company should follow as well as plan how to implement the policies. To meet this standard, you should:

- Find out where you are now in the management of health and safety at work by conducting an initial assessment and decide where you need to be.
- Identify all the legal requirements applicable to your operations.
- Indicate what you want to achieve in managing health and safety by specifying your aims and objectives.
- Define roles and responsibilities to implement the policy and decide who will be responsible and allocate roles.
- Decide how you will achieve your aims and objectives and measure your success in managing health and safety.
- Put your policy and the plan to implement it in writing.
- Identify the ways you will measure your performance.
- Identify foreseeable emergencies at the mine such as fire and explosion, rock fall and make sure you cooperate with neighbours or any other persons with whom you share your workplace and coordinate your emergency response plans with them.
- Make plans for changes that you may need to introduce, for example, changes required by new legislation, new plant and equipment you purchase.

DO

At this stage you establish and implement the OHSMS and there are specific standards which are also implicit in MHSa that the employer should follow:

- 1) As an employer, you should clarify responsibilities at all levels of your business and ensure that the activities of everyone involved in managing health and safety are clear, understood and properly coordinated in the entire organisation. Your organisational chart (organogram) should show clear lines of responsibilities and accountability from senior management down to employees.
- 2) You should develop an effective health and safety plan to implement your health and safety policy and your plan must be proportionate to the hazards and risks of your operations. To do this you need to:
 - Establish your risk profile by identifying what could cause harm in your workplace, who could be harmed and how and the measures you will take to manage the risk.
 - Prioritize your risks by identifying the most important risks that need to be addressed first.
- 3) You should organise your activities to implement or put your plan into practice. You do this by putting in place proper means of communicating and consulting with employees including:
 - Demonstrating a positive approach to health and safety by involving and communicating with workers so that they understand what is expected of them and can express concern and make suggestions thereby developing positive health and safety attitudes and behaviours.
 - Establish health and safety committee where necessary that can initiate, develop and carry out measures to take care of the health and safety of workers.
 - Providing adequate resources to enable them accomplish their tasks and if necessary invite experts to give competent advice.
 - Determine and put in place measures to prevent and control hazards and develop the procedures which spell out how to go about implementing them.
 - Provide the people who work for you the right tools to do their job and maintain them regularly.
- 4) As an employer, you should put in place systems and make arrangements to ensure that all your workers are competent. Section 7 of the MHSa requires you to take into consideration an employee's training and capabilities before assigning a task to that employee. So you need competent staff to manage the risks of your operations and competence is required at all levels from Board level down to employees. You ensure competence by:
 - Training, instructing and providing information so that people do their work well.
 - Supervising your workers to make sure that they follow all arrangements.

CHECK

How well are you controlling risks?

As an employer, you should measure what you are doing to put into practice your health and safety policy, to assess how well you are controlling risks and developing a positive health and safety culture at work. To check your health and safety management system you need to:

- Measure your performance to make sure your plan is being implemented by assessing how well your control measures are working and your risks are being controlled. This will tell you how well you are doing in achieving your aims and objectives. You will need to carry out active monitoring, for example, on-going risk assessments, workplace inspections, occupational hygiene measurements and medical surveillance Sections 11-13 of the MHSa) and reactive monitoring of your health and safety operations (for example accident investigation) or audits of the management system or its elements.
- Conduct investigation of accidents, incidents, near misses and cases of ill-health and analyse the causes and take corrective action so that failures do not happen again.

ACT

AS an employer, make sure that you have a documented process which enables you to conduct audits and review of your occupational health and safety management system:

- Review your performance to establish whether the health and safety arrangements you put in place still make sense or are outdated. You can then validate the systems in place or stop doing things that are no longer necessary and strengthen and promote things you are doing well. You can do this by:
 - Learning from accidents, incidents and ill-health information, errors and experience (benchmarks) from similar organisations; For example, Analysis of important incidents can show you that you have in your hands the potential for very serious injury or fatality. It can also point to the existence of hazardous conditions such as the accumulation of flammable gas which can be ignited, unstable strata that can cause rock fall or ground collapse, inadequate ventilation or high dust levels in the mine.
 - Going over plans, policies and risk assessment reports to see if you need to update them.
- Take corrective action from the lessons you have learned from active and reactive monitoring and from audits.

Summary of the Plan-do-check-act model include:

- | |
|---|
| <ul style="list-style-type: none"> • Plan-do-check-act is not a once-off action that ends after one cycle. • You may need to go round the cycle more than once especially if: <ul style="list-style-type: none"> - You are just starting to develop your health and safety management system - You are developing a new process. - You are implementing any change (for example bringing in a new plant or technology) • All the elements of plan-do-check-act are linked and interact with each other making the approach systematic and sustainable. |
|---|

How you can apply the management model to elements of your health and safety management system?

Example 1

Preparing and maintaining a Code of Practice on any matter affecting the health of employees and others who may be directly affected by activities at the mine (S.9 MHSa)

To comply with this requirement, you should have a policy on the formulation, implementation, monitoring and reviewing of the Code(s) of Practice:

1. Develop and adopt a policy and formulate a plan to put it into practice: make sure you have a copy of the MHSa and refer to Section 8 on Policy and Section 9 on Codes of practice and consult your employees in the process (Section 8(2) of the MHSa).
2. Demonstrate your commitment and support for the policy by providing adequate resources in the form of people and money that will implement the plan or draw up the Code(s).
3. Set the performance standards or indicators for implementing the code(s) of practice at all levels of the organisation.
4. Monitor whether people are complying with the Code(s) of practice and measure or assess their performance to know whether you are achieving the standards or indicators you set.
5. Schedule and run periodic safety audits to check whether your policy on Code(s) of practice still makes sense and is working well and reliable or it is out-dated and changes need to be made to ensure continual development.
6. Analyse the results of monitoring and audit and feed them back to the stages in which you developed and put the policy into practice so that the improvement opportunities you identified can be put into effect to improve the performance of the code(s) of practice as an element of the occupational health and safety management system.
7. Keep records of all monitoring and implementation activities so that the information can be used to review and continually improve the Code(s) of practice.

Example 2

Employers to provide proper training to employees (Section 10 (2) of the MHSa)

This means that as an employer, you must properly train all the people who work for you so that they can deal with the risks to their health and safety, know the measures you have put in place to eliminate, control and reduce risks and how to use them including the procedures they must follow to work safely and what to do when there is an emergency.

To comply with this requirement, you should have a policy to provide your employees training:

- Prepare a health and safety training policy for the organisation: make sure you have your copy of MHSa and refer to Sections 7, 8, and 10 on information, instruction and training of workers and consult your employees on the issue (Section 8 (2) of the MHSa).
- Identify the training needs of your employees and formulate training objectives and methods.
- Formulate a plan or programme to implement the policy and to arrange for training to be delivered to your employees.

- Determine the performance standards or indicators that you will use to check the implementation of the training.
- Monitor and review the progress you are making in the training programme against the standards you set. Check to know whether the training you have provided to your employees is effective in achieving the training objectives and whether the entire training policy is working well.
- You should also conduct audit of the training policy periodically to check whether it is still useful and reliable.
- Analyse the results you obtained from monitoring and audits and identify weaknesses, strengths and opportunities for improving the system and feed these back to the planning and implementation stages so that these can be used to improve the training element of the health and safety management system.
- Keep a record of all training and monitoring activities so that the information can be used to review and continually improve the training policy and programme.

What happens in mines that are leading examples in the management of health and safety at work?

- Leadership is provided at all levels of the business.
- Managers, supervisors and workers are all involved.
- Managers, supervisors and workers all understand their responsibilities for preventing accidents and ensuring safety at work.
- Achievements in health and safety are rewarded equally as achievements in operations.

5 LEGISLATIVE FRAMEWORK

5.1 Know the main principles of the Mine Health and Safety Act

The ILO Conventions 155 (OSH) and 161 (OH Services) start from the principle that occupational health and safety and occupational health service are a right of each individual taking part in work irrespective of the economic sector, size of the company and nature of the work operations. This principle is enshrined in Section 2 of the MHSA, which lays down the duty of the employer to provide a working environment that is safe and healthy for work.

Though MHSA and its regulations constitute the main body of legislation that regulates occupational health and safety in the South African Mining industry, other pieces of legislation such as Hazardous Substances Act, 1973 (Act No. 15 of 1973) and Labour Relations Act apply to you. In addition, the DMR and MHSC issue guidance notes and guidelines to help you implement certain provisions or requirements of MHSA. For example, you can access and download from their website DMR Guidelines on how to develop your mandatory Codes of Practice.

This section is meant to help you understand the central aspects of the mining health and safety legislation, in particular MHSA especially regarding the development, implementation and maintenance of an occupational health and safety management system at your mine and does not dwell on every requirement of the Act.

The MHSA and regulations establish the minimum standards for keeping your mine healthy and safe for work.

MHSA is based on:

- The duty of care shared between the employer and the employee with the primary responsibility resting on the employer or operator of the mine site for the provision of a healthy and safe workplace.
- Risk management principles (enforcement protocols are risk-based, action defined by level and immediacy of the risk).
- Stakeholder involvement or worker participation.
- Monitoring how well the legislation as well as your health and safety management system are being implemented): Government inspectors acting as both enforcers of legislative and regulatory requirements and mentors encouraging good health and safety performance.

Duty of care principle

The duty of care is one of the main principles of the MHSA. In simple terms, Section 2 of the Act states that as the employer, you must, as far as reasonably practicable provide a work environment in which the people who work for you are not exposed to hazards or things that can harm them and must give them information, training and supervision to ensure they work in a safe manner. MHSA also require employees to take reasonable care for their own health.

The duty of care will be covered in subsequent sections of these guidelines. For now you should understand that the duty of care is shared between you, the employer or mine operator and your employees but the primary responsibility of managing health and safety to ensure healthy and safe working conditions lies with you. This is so because you, the owner is largely in control of the working conditions at your mine. The shared roles prescribed by MHSA are to make the management of health and safety easy and encourage employer and workforce to cooperate in making the workplace healthy and safe. Health and safety is everyone's business.

There are other important aspects of the duty of care that are particularly relevant to the employer. As the owner of the mine, you owe a higher duty of care to employees in certain circumstances:

- To an inexperienced employee than to one who has experience, for example a worker you have just employed than one who has been working for a year or more and knows your procedures.
- To a vulnerable employee with special needs than one who is not, for example pregnant women, breast feeding mothers, women for some jobs where you need a risk assessment for them.

In addition, you owe a higher duty of care to employees working in hazardous environments, for example where there is coal or quartz dust, explosives are used, there is potential for rock fall or accumulation of flammable gas or methane. That is why in some of these circumstances the MHSA requires you to develop mandatory Codes of Practice, carry out occupational hygiene measurements and medical surveillance of workers.

Risk management principle

The management of workplace hazards and risks is central to modern health and safety legislation and this applies to the MHSA. All efforts to manage health and safety at work are geared principally towards finding hazards and removing them or reducing their risks to make the workplace healthier and safer to work in. Hence Section 11 of the MHSA requires

mine managers to identify hazards, assess their risks and put in place measures to remove or reduce them.

MHSA does not tell you what the acceptable levels of risk should be but leaves it to you, the mine operator to determine taking into consideration how severe the risk of the hazard is, knowledge about a specific hazard and the ways of controlling its risk, whether ways to remove or reduce the risk is available for use and the cost of doing so. As shown in figure 3 the MHSA regulates the management of hazards and their risks as an on-going process in which the mine operator should:

- Identify potential hazards at the mine
- Assess the level of risk
- Develop and put into effect control measures to remove or reduce the risks to acceptable level
- Monitor whether the control measures are working well
- Assess and monitor the level of portions of risk that still remains even with the controls in place (residual risk).

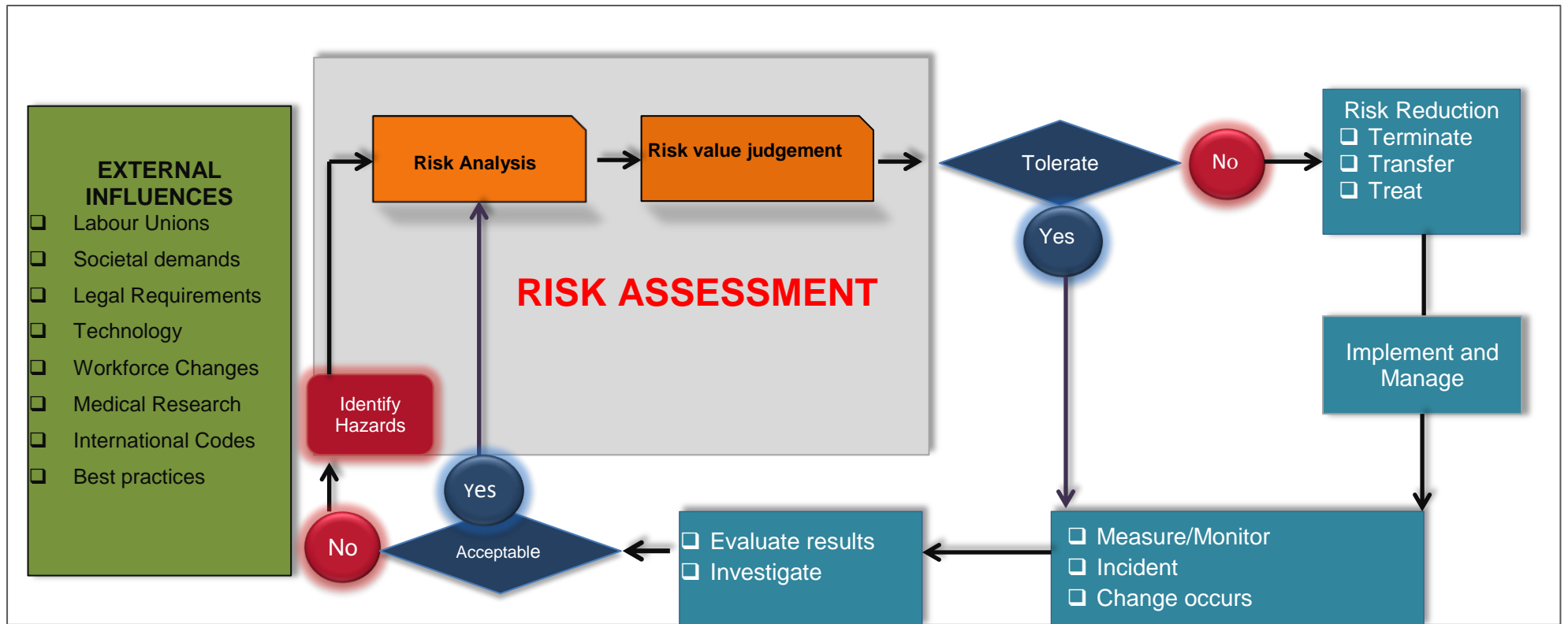


Figure 3: Hazard identification and risk assessment process

Stakeholder Involvement (worker participation)

In the section introducing the occupational health and safety management system you read about participation of the people who work for you in the management of health and safety at work. The MHSA assigns an important role for workers to play in putting into practice the occupational health and safety management system and devotes a full chapter 3 to health and safety representatives and committees, structures through which employees are consulted and participate in managing matters that concern their own health and safety in the mine. Guidelines for establishing employee consultation and participation are detailed in section 6.4.16.

Other stakeholders also play an important role in influencing reform and implementation of occupational health and safety legislation. The MHSA requires you to ensure that your workers are competent to do their work safely as seen in the previous sections by defining the competencies and providing the required training. The Tripartite Advisory Council at DME consisting of representatives of Government, employers and workers is a stakeholder, which plays an important role in promoting the management of health and safety at work. For example, the Council advises the Minister on reforms to health and safety legislation and also has the power to define training competencies in health and safety.

Monitoring how well health and safety legislation and the health and safety management system are being implemented

The MHSA has included tools in the Act of Law which can be used to check whether the Act itself is being implemented well or as desired. The same tools can be used to check whether the health and safety management system is performing well. For example, MHSA requires you as an operator of a mine:

- To carry out regular audit and review of the health and safety management system. The Regulator can scrutinize the audit and review processes by making spot checks and in certain cases high-level audits of the health and safety management system at the mine. This is why you are advised to use accredited external auditors to review your health and safety management system.
- To report all accidents and significant incidents, injuries and serious illnesses. Though these reports may show significant non-conformities to the MHSA and your procedures when they are analysed to identify the underlying or root causes. Significant incidents may point out:
 - The potential for injury and fatality.
 - The potential for hazardous conditions such as the accumulation of flammable gas e.g. methane, unstable ground or strata that can lead to rock fall collapse of ground.

5.2 List of legislation and applicable international standards

Legislation and Regulations

- Mine Health and Safety Act, 1996 (Act No. 29 of 1996)
- Mine Health and Safety Act (No. 29 of 1996) Regulations
- Mine health and Safety Act Amendment of Regulations
- Compensation for Occupational Injuries and Diseases Act (Act 130 of 1993) as amended
- Hazardous Substances Act, 1073 (Act No. 15 of 1973)
- Hazardous Substances Regulations, 1995

- Labour Relations Act

Guidelines and Guidance notes (some examples)

- a. Department of Minerals and Energy (2003) Guideline for the compilation of mandatory code of practice for an occupational Health programme (occupational Hygiene and medical surveillance) for noise. Mine health and safety inspectorate DME 16/3/2/4-A3.
- b. Department of Minerals and Energy (2003) Guideline for the compilation of mandatory code of practice for an occupational Health programme (occupational Hygiene and medical surveillance) on Thermal stress No. 16/3/2/4-A2 Mine Health and Safety Inspectorate.

DME Guidance note for occupational medical practitioners-Lung function testing-Mine Health and Safety Inspectorate

International Conventions

- a. ILO Convention on Occupational Safety and Health and the Working Environment (C-155 of 1981)
- b. ILO: Safety and Health in Mines Convention, 1995 (No. 176)
- c. ILO Convention on Occupational Health Services (C-161 of 1985)
- d. ILO Convention on Labour Inspection (C-81)
- e. ILO Convention on Radiation (C-115)
- f. ILO Convention on Guarding of Machinery (C-119)
- g. ILO Convention on working environment (Air pollution, noise and vibration) (C-148)

6 GUIDELINES

6.1 Guidelines for developing and implementing a workplace health and safety policy

What the MHSa says?

Section 8 of the MHSa describes what the occupational health and safety policy is; what you should put in it, and how you should go about preparing it, making people know about it and making sure that they understand their responsibilities to put it into practice.

Section 8 (1) of the MHSa states that your Manager must put in place a health and safety policy document which:

- Shows how you organise work at your mine.
- Establishes a policy to protect the health and safety of the people who work for you.
- Sets out the ways and means that will enable you put into practice the policy and make changes when needed.

Section 8 (2) of the MHSa says that in preparing or making changes to the policy, the manager must consult workers through the health and safety committee and,

Section 8 (3) of the MHSa states that you must display the policy openly at places in the workplace so that workers can see it, read and understand; the Manager must give a copy to each health and safety representative.

What does a health and safety policy means?

A general health and safety policy is a document, which shows clearly senior management's, or your commitment and approach in providing and maintaining a healthy and safe work environment to comply with what MHSa wants you to do. As an employer, you must have a document, which states your principles and instructions on health and safety actions at your mine. The policy tells your workers, sub-contractors and their workers, suppliers and other clients about your vision, direction and goals for health and safety at work and your commitment to achieving them.

Why you need a general health and safety policy?

As an employer, the health and safety policy you put in place is your commitment to provide a healthy and safe workplace and to comply with MHSa requirements. When you write your policy and authorise it to be effective at the mine, this enables you to:

- Show your leadership's personal and corporate commitment to a healthy and safe workplace.
- Make your employees to understand that health and safety is of highest importance throughout the organisation and that any unsafe practices would not be acceptable.
- The level of health and safety performance at mine is determined by the amount of your commitment to it just as your commitment to quality determines the actual quality of your products.
- A written policy sends a clear message to everyone from top management that it values the health, safety and wellbeing of your workers.
- Show that the health and safety policy is the starting point to establishing a health and safety programme at work and is at the centre of all health and safety activities at the mine.

What is a comprehensive health and safety policy?

A comprehensive policy is one which:

- Expresses senior management commitment to protect the health and safety of employees.
- Clearly identifies and states the objectives of the health and safety programme.
- States the company's vision or direction for health and safety so that people should know and understand it.
- Shows who is answerable for the health and safety programmes.
- States what the general responsibilities of employees for health and safety are.
- States clearly that health and safety will not be sacrificed for any one's convenience.
- States clearly that unsafe behaviour will not be acceptable.

Your health and safety policy is a statement of principles and general rules that must be brought to life with action. Once this is done, it becomes a breathing thing that will consistently change with time as the law, technology, job functions and business activities change.

Main areas of focus that should be included in your policy statement

Your health and safety policy is a statement of your intent and should contain:

- Your vision or direction to health and safety in your company, for example a statement that the employer will provide workers a healthy and safe workplace and health and safety will be integrated in everyday work activity in the mine.

- Your senior management's commitment to health and safety for example, a statement expressing your duty of care to your workers and saying that you will do everything that can be done to prevent injury or illness to a worker. For example, you can state that:
 - You will make sure that workers are provided adequate information about the hazards and risks of their work and they are given training so that they can learn how to do their work in a healthy and safe way.
 - You will provide staff whose job is to see that work is done in a safe manner.
- What you want your health and safety programme to achieve. These are the company's health and safety goals or objectives e.g. state that you intend to provide and maintain a workplace free of injury and illness, or that you will strive to achieve zero harm to anyone at work and the environment.
- The identity of the people who will be responsible and answerable for putting into practice the elements of your health and safety programme.
- The responsibility of workers and other persons in the workplace by including a statement that all workers must take care to make sure that the workplace is healthy and safe for work and if not to explain why.
- A statement that bad health and safety behaviour will not be acceptable.
- A statement that you will work with everyone in the company to make sure what the policy advises is put into practice.
- A statement that the policy will be checked at least once a year to ensure that it is working well and to follow any changes in the law and the workplace itself.

Principles you should include in your policy statement

To ensure that you are complying with the law, it is a good idea to include the following principles in your policy statement:

- Working in a safe and healthy way is a condition for employment at your mine.
- Health and safety is everyone's responsibility.
- Everyone is accountable for his or her health and safety performance.
- Health and safety is a priority and is given equal importance as production, cost control and quality.
- All hazards will be identified and removed or controlled.
- Health and safety training and supervision of workers will be consistent and on-going.
- Health and safety meetings will be held regularly.
- Regular workplace inspections will be conducted at the mine.
- All accidents, incidents, near misses and work-related illnesses will be reported and investigated and action taken to prevent reoccurrence.

Who should know about the policy?

- All employees should know about the policy including their duties under the policy.
- Your suppliers, contractors/sub-contractors and their workers.
- Your clients.
- New employees during induction training.

Make sure you train managers, supervisors, workers, health and safety representatives and committee members to carry out their duties in the policy properly.

What you need to do to ensure that your policy works well: the formal aspects?

You have no intention of locking up your policy in your drawers. You want to put it into practice. For your policy to be put into practice properly and work well you should do the following:

- Make sure the owner, Chief Executive Officer (CEO) or General Manager and an employees' representative have signed and authorized the policy.
- Make sure you have told all new employees about the policy as part of your hiring process.
- Send a copy to each health and safety representative who is the direct link between your management and employees and can explain the contents to them better and make sure it is followed throughout the organisation. This is also a MSHA requirement (Section 8 (3)).
- You can use the policy to introduce your health and safety programme during induction for new workers.
- Make sure your workers understand the policy by putting it in simple language and if possible their local language.
- State clearly who will be responsible and answerable for putting the policy into action.
- Provide money and people to put the policy into practice and make it work.
- The most senior manager, e.g. the General Manager and the representative of your workers must sign the policy.
- State that you attach equal importance to health and safety as other business policies of the company.
- State that the policy must be followed in all work activities.
- State a time frame for revising and updating the policy.
- Tell your suppliers, contractors, subcontractors and clients about the policy and your health and safety programme.
- Ensure you date, review and sign the policy every year.

Statement of intent

The policy statement of intent clearly:

- States the goals of the company in health and safety, e.g. "to be the safest mine in South Africa;" the objectives of the company in health and safety, e.g. "to maintain a workplace free of injury or illness"; "To comply with all relevant occupational health and safety legislation, regulations, internal standards and collective agreements relating to health and safety at work", and management commitment to achieve the goals and objectives.
- Describes the duties and responsibilities of everyone at all levels of the organisation in ensuring and promoting health and safety at work.
- Acknowledge that employees are an important resource to the company and their wellbeing is of utmost importance.

How you prepare policy goals and objectives?

- Firstly, you should state your organisation's health and safety management goals.

Your health and safety management goals are to:

- Meet the legal requirements or standards that apply to mining, e.g. MHSA and Regulations and other related legislation.
- Ensure that the workplace is as far as is reasonably practicable safe and without risk to health for employees.

These are your primary health and safety objectives and are stated in Section 2 of the MHSA.

Example of how you state a general objective?

“Gauteng Mining will foster a healthy, safe, satisfying and non-discriminatory work environment”.

You need to determine what you will do to achieve your more general objective. In some cases the law may tell you what to do.

In your policy you state the objective and then ways you intend to achieve it, for example state that you will ensure a safe and healthy work environment by:

- Managing health and safety in an effective way in which senior management shows commitment to and personal involvement in health and safety at all levels of the company.
- Planning and controlling work to avoid conditions or situations that can cause harm to employees.
- Providing facilities and equipment to ensure safe and healthy conditions of work.
- Providing information, education, training and supervision to ensure workers do their job in a safe and health manner.
- Ensuring teamwork, proper two-way communication as part and parcel of every job at the mine.

The above are your more specific objectives and you also need to work out how you will go about achieving them, i.e. develop the programmes to meet the specific objectives, e.g. your training programme, risk management programme, programme for maintenance of work equipment, programme for the selection and provision of PPE, etc.

Other specific objectives of your health and safety policy relate to your health and safety strategies, commitment, roles and responsibilities (functions) and the workplace environment.

State your strategic goals

State for example that:

- You will develop health and safety strategies every year to promote workplace health and safety performance.
- Health and safety systems and programmes will be consistently checked, reviewed and revised as an on-going exercise to improve standards and ensure they are working well.

State your commitment and responsibility goals

For example state that:

- The personal commitment of senior management to health and safety will be shown at all levels of the company.
- Managers will have responsibility for the health and safety of employees under them.
- A high level of health and safety awareness will be promoted and maintained at all levels of the company.
- All employees will take care, as far as is reasonably able, to their own health and safety and that of their colleagues and others that may be affected by what they do or fail to do.
- Everyone in the company will understand their specific roles and responsibilities for health and safety at work.

State your environment goals

State for example that:

- Health and safety practices and procedures including the work environment will be reviewed and revised regularly.
- Formal consultation and communication with employees and their representatives in all health and safety matters will occur through health and safety committees, team briefings and management involvement and commitment.
- All accidents, incidents and near misses including illnesses will be reported, investigated and corrective action taken as a priority.
- The purpose of an investigation will not be to apportion blame but to determine the underlying cause of the incident to prevent reoccurrence.

Check your understanding of evaluation

When you evaluate your systems against the goals above, you will need to check two things:

- It is a good idea to use an audit to check whether all the arrangements are in place to achieve the goals or objectives as you proposed in the policy; for example have you put in place a training programme?
- The other side of the evaluation will be for you to check whether those arrangements that are in place are working well to achieve objectives; for example check whether you are meeting training targets and employees are working effectively after receiving training.
- For your strategic goals, check each strategy to see how well it is helping you to achieve the objective of improving health and safety performance at work.

Other things to consider when preparing your policy

You are the owner of the mine or employer and so the policy shows what you want to be done to keep the mine a healthy and safe place of work. However there are some things you must consider when you prepare your policy:

- Make sure that your workers have their say by consulting them individually or through their representatives. Consulting workers and including their ideas in your policy will make it work.

- Make sure that your main effort is to protect workers from the hazards and risks of your operations.
- Make sure everyone knows you attach the greatest importance to the health and safety of the people who work for you.
- Make sure you meet MSHA requirements or what the law says you should do to provide a healthy and safe work environment.

Understanding specific policies and procedures and how to develop them?

Your specific policies and procedures are examples of administrative measures you use to control risks at the mine. Since they are low in the hierarchy of controls, you must use policies and procedures with other more effective control measures such as elimination, substitution and engineering methods, for example using damping techniques to control dust from source during drilling.

What is the difference between a policy and a procedure?

What are specific policies?

As part of your health and safety management, you can adopt a policy which states what you want to do about a specific issue at the mine, for example use of alcohol and drugs and other intoxicating substances at the mine and violence and sexual harassment. These policies support the general health and safety policy.

Your alcohol and drug use policy will state your rules about alcohol and drug use at work, for example that you are banning the presence and use of alcohol and drugs at the mine and that any violations will result in dismissal. The policy will normally state: the specific objective you want to meet with the time schedule; commitment by senior management that time, money and people will be made available to put the policy into practice and make sure it is followed; an indication of consultation with the health and safety committee when preparing and putting into practice the policy; a specification how the policy should be carried out; a statement telling everyone their role or what the policy expects them to do and making sure that they understand it, and arrangements for checking whether the policy is being followed and is working well and for reviewing it. Other examples of policies include:

- Non-smoking policy.
- Policy for the management of HIV/AIDS, TB and Silicosis.
- Policy for the selection and provision of Personal protective clothing and equipment.

What is a procedure?

MSHA and regulations require you to develop procedures and mandatory codes of practice for matters affecting the health and safety of employees including procedures to deal with specific activities and events such as accidents and emergencies. A procedure spells out (in a step-by-step manner), instructions showing how to deal with or handle a specific activity at work. Examples of procedures include:

- Procedure for working in confined space.
- Procedure for the election and appointment of health and safety representatives and committees (chapter 3 of the MSHA; chapter 6 of the MSHA Regulations).
- Procedure for conducting hazard identification and risk assessment.
- Risk control procedure.
- Procedure for carrying out workplace inspections.
- Mandatory codes of practice.

- Safe work procedures including permit-to-work, isolation, method statement of what to do at every stage of work where there is a hazard or risk).
- Accident/incident, illness investigation and reporting procedure.
- Purchasing procedure.
- Procedure for selecting sub-contractors.
- Procedures for the installation, examination, maintenance and operation of specific plant and equipment e.g. Scraper or mono winch, lifting equipment and lifting tackle, Ventilation fans, refrigeration plants.
- First aid and medical emergencies.
- Emergency evacuation procedure.
- Procedure for occupational hygiene measurements.
- Medical surveillance procedure.
- Procedure for the management of change.
- Procedure for the management of visitors.
- Disciplinary procedures.
- Procedure for issue resolution, for example, refusal to work or stopping work due to hazardous conditions.
- Record keeping and document control procedure, etc.

What do you do to establish a policy or a procedure for your mine?

You must remember that a policy shows what you want to do about a specific issue at the mine such as HIV/AIDS while a procedure provides step-by-step instructions on how to carry out a specific activity such as the installation of a scraper winch. Briefly, you can prepare and put into practice a policy or procedure by following these steps and the best way is to have your own people with knowledge and experience of your workplace and area concerned to do it for you and if necessary invite experts from outside:

- Identify the hazards or issues in the workplace for example, do you want to prevent injuries from scraper winches, lifting equipment and lifting tackles (procedures) or prevent unsafe acts which can cause injuries of workers under the influence of alcohol and drugs (policy issue).
- You need to collect information about the hazard or issue. If it is a hazard, you need information that will tell you why the hazard occurs, the risk and factors influencing it; refer to MHSA and regulatory requirements (see for example, MHSA Regulations 8.4-8.7; DME Guidelines and guidance notes); Check plant and equipment manuals, manufacturer's safety data sheets; consult employees and their representatives, they are a fertile source of information; check your accident investigation reports, Consultant reports; your own company records and practice of other companies in the mining industry; visit DME and DOL websites and refer to authoritative publications and scientific articles on occupational health and safety relating to the issues or activity.
- Develop or draft the policy. Remember to consult your health and safety committee and tap from their vast knowledge of health and safety at your mine. Your policy or procedure can be drafted by a working group you have set up, management, health and safety representative, an experienced supervisor or health and safety officer. When the draft is completed make sure you give it to the health and safety committee to review and then test it and make corrections if necessary before you put into practice. You can choose specific work areas where to pilot-test the procedure bearing in mind the nature of the hazard and whether employees will participate willingly.

- Put the policy or procedure into practice. Remember that procedures need to be understood by the persons who use them. This means that you must find the best way of presenting the procedure to your workers so they can understand it properly. You can explain policies and procedures during induction and refresher training. You can prepare video clips that explain your procedures. Train your employees properly on the procedures so that they understand and can follow them properly and avoid injury to themselves and others. You may need support systems to implement a policy or procedure. You may need to change work layout to install certain equipment. Any changes should be included in the procedure.
- Assess and regularly review your policies and procedures and make changes if needed. Check to see whether your policies and procedures are supporting you well in controlling hazards at work and making your workplace safe. It may be that you are spending much money but not getting the good results you aimed to achieve. This requires you to prepare a plan showing the dates you will review every procedure and policy you have adopted in your mine. Reviewing your policies and procedures will help you identify shortfalls and incidences of failure employees raised and you can make changes to improve them.

The following sample of policies and procedures are provided as appendices in this guideline:

- Sample General OHS Policy: Appendix A
- Sample specific policy: Appendix B
- Sample procedure: Appendix C

6.2 Guidelines for determining and allocating roles, responsibilities and accountability

Roles, responsibilities and accountabilities

What the MHSR and Regulations say?

The Government of South Africa, mine operators and workers all have a role to play in ensuring a healthy and safe work environment in mines.

Government role and responsibility

Government carries out the function of taking care of the mineral resources in the country for the benefit of the whole community. It makes laws such as the Mine Health and Safety Act and Regulations including other pieces of legislation to ensure that mines are operated with little risk to the people who work in them or to the community.

The general objectives of the MHSR and Regulations are to:

- Make sure that mine owners or employers, workers and sub-contractors agree to manage and improve health and safety in the mines.
- Encourage education, training and raising of awareness on health and safety in mines.
- Introduce ways of checking the health and safety performance of mines.
- Express its views about health and safety in mines and also say what it thinks should be done (enforcement).
- Ensure that mines have people whose job is to make sure that the law is followed (MHSR and other legal requirements).

- Investigate an accident or dangerous occurrence if this would help improve health and safety in the mine.

How Government makes sure that MSHA and other laws are followed?

The Government has the Inspectorate consisting of a team of Inspectors at DME whose job is to monitor, check, give advice or coach where necessary and make sure that mine health and safety law is followed. Inspectors of mines enforce the MSHA and Regulations and other applicable legislation.

What is the aim of the Inspectorate?

- To promote the best performance in health and safety.
- To ensure that mine operators make it easy to inspect and examine all records on health and safety at the mine.
- To ask mine operators to quickly fix any problem or defect found at the mine.
- Investigate the events and cause surrounding every fatal or serious accident and dangerous occurrence.
- Provide mine operators information and education to help them follow the law, for example develop and give them guidelines that are easy to use on specific health and safety issues. This also encourages the best safety performance.

According to Section 50 of the MSHA an inspector can enter your mine at any time without warrant or notice to monitor or make sure that you are meeting the requirements the MSHA. You and your employees are obliged by to provide any facility that the inspector reasonably demands to do his/her work and anyone questioned by the inspector should answer the questions to the best of his/her knowledge leaving out incriminating answers (Section 52 of the MSHA).

What actions can an Inspector of mines take?

When an inspector of mines visits your mine, he/she may find something that happened, something you are doing or a condition in a work area that is a danger for the health and safety of any person at the mine. In this case the inspector can issue an instruction to help protect the health and safety of your workers. He can order you to:

- Halt operations at the mine or part of the mine.
- Suspend or halt what was being done that is dangerous. The inspector may give you steps to take to rectify the situation.
- You must take the steps in the inspector's instruction within the period specified to correct the problem.
- You must move everyone away from the area to a safe place and leave only the persons helping to fix the problem.
- The inspector must listen and hear what the employer, employees and their representatives have to say about the problem before making an instruction.
- The Chief Inspector of Mines can confirm, change or simply annul an instruction.

It is an offence if you fail to comply with an instruction. The Principal Inspector can fine the employer or owner or even refer the matter to the Attorney General for prosecution. Once you have been served an instruction, give a copy to the safety representative and committee, explain the contents orally to employees affected and display it in an open place so they can see and read it.

The MSHA specify duty holders including mine owners or employers, managers, supervisors and workers, etc. and their responsibilities (what they must do) in the management of health and safety in the mine. Duty holders may also be asked if and how they have carried out their duties (they are accountable for their duties).

Who are duty holders?

Duty holders under MSHA include:

- Employers
- Managers and supervisors
- Workers
- PPE Designers
- Suppliers and manufacturers

What is the meaning of duty of care?

The duty of care is the legal responsibility of the employer, workers, contractors and sub-contractors, designers, suppliers and manufacturers to do everything that is reasonably practicable to protect the health and safety of people who work at the mine. Duty of care is shared but as the employer, you have the highest responsibility because the conditions in the mine are under your control and workers mostly do what you tell them.

The meaning of due diligence and how it affects your health and safety programme

MSHA sets out the general duties of stakeholders at the mine. Due diligence means taking reasonable care or doing all that a person can and arises from the shared responsibility of employer and employees for health and safety at work. Thus, everyone having responsibility for health and safety at the mine must do all that he/she is reasonably able to do in that situation to avoid injury or illness. Individuals will also be held answerable or accountable for what they do (their acts) and what they fail to do (their omissions).

Two sides of due diligence you should consider include:

- You should do what is reasonably practicable. This is a high standard which the law has placed, requiring a person at work to do his best in his/her work, acting with common sense and taking reasonable care.
- The level of risk in the type of work a person is doing is important in determining the care you need to take. The level of risk determines how the worker will do the work hence the higher the risk the greater the safety measures that you as the employer will have to take to remove or minimise the risk.

Due diligence and your health and safety plan or programme

You need to apply some criteria for due diligence when you are preparing the health and safety programmes that will meet your policy objectives:

- The health and safety programme should satisfy the following conditions:
 - It should systematically identify hazards and assess their risks.
 - It should make plans to manage the risks (plans to remove or reduce the risks).
 - The risk control plans should reduce the likelihood for those hazards to cause harm.
- The health and safety programme should be adequate.

Your health and safety programme should:

- Meet the needs of your workplace and workers (be appropriate to the size and activities of your business).
- Make arrangements to monitor and evaluate whether the programme is working well. This means that you must get people, provide them the ways and the means for them to check whether the programme is working well and achieving objectives and meeting MHSa requirements.
- It will be good for you to compare your own programmes with what other mines are doing.

The idea of due diligence is important in health and safety practice at your mine because it is linked to the issue of accountability for your actions in health and safety. Due diligence means taking all steps possible to protect the health and safety of workers. This includes:

- Working with care and showing that you care about your workplace and colleagues by taking all sensible steps to carry out your duties.
- Following what the law requires you to do including mining industry standards or procedures.
- Following professional rules.
- Following what the courts say.
- Looking for hazards at work and the special ways you do your work.
- Protecting your workers from hazards once they are found by doing something to make sure an accident will not occur.
- Telling others about the hazards you have found and their risks and what you are doing to remove or reduce them.

Due diligence can be used as a defence in court if say a manager, supervisor or an employee is charged for things that happened (a fatal accident for example). Your offence will be a strict liability offence meaning that the prosecution must only prove that the offence occurred and not the intent (not that the defendant meant to commit the offence).

You can plead the defence of “due diligence” by showing that the accused person took all “reasonable” steps to prevent the offence from happening.

What does this means in practice?

- If an accident occurs, it won't be good enough just to show that your workplace had a health and safety management system in place. You will have to show that the people who worked in the area took every step possible to prevent the accident from occurring.
- The health and safety system must be able to protect workers from the worst things that can happen (by reducing risks to acceptable levels).
- The duties of the organisation, its manager, supervisors and workers complement each other.

Summary of how you set your health and safety programme to meet the requirements of due diligence and work properly:

- Prepare a policy, which shows your commitment to a healthy and safe workplace.
- Put in place sufficient systems to identify and control hazards at work
- Identify and get the people, money and procedures that you need to deal with emergency situations that may arise at the mine.
- Prepare a statement, which shows responsibilities for health and safety: who is responsible for what in the workplace.
- Make a plan to enable you to conduct regular planned and surprise inspections of the work areas.
- Develop plans to control biological and chemical hazards.
- Develop training plans for workers and supervisors.
- Develop safe work procedures e.g. codes of practice.
- Develop procedure to investigate accidents, dangerous occurrences and refusals to work.
- Develop ways you will involve workers in the health and safety programme.
- Make sure you regularly assess and make necessary changes to your programme.
- Develop a plan to return workers who had been injured or were ill due to work to productive jobs within the workplace.

What is the responsibility system for health and safety within your workplace?

- The MHSA establishes workers' right to a healthy and safe workplace and requires everyone in the workplace to work together to prevent injuries and ill-health. This is called the internal responsibility system.
- The MHSA sets down three basic rights of your employees:
 - The right to know about the hazards in the workplace, how to identify them and protect themselves.
 - The right to take part in making decisions about health and safety at work.
 - The right to refuse work, which the worker believes, is unusually dangerous (Section 23 of the MHSA).
- The MHSA prohibits employers from disciplining or imposing any other sanctions on workers for fulfilling their responsibilities or using their rights under MHSA and Regulations. This is meant to encourage workers to participate actively in health and safety matters and work with their supervisors to prevent injuries and illnesses at work.
- The internal responsibility system requires everyone, from General Manager down to the newest person employed to make good practice part of everything they do at work.
- As the employer, you have the most responsibility for providing a healthy and safe workplace because you have the greatest degree of control over your workplace
- Supervisors and workers have the responsibility to take the necessary precautions to protect themselves and others from workplace hazards as far as they reasonably can.

General duty for workplace health and safety: a shared responsibility

Under the MHSA and related Regulations employers, managers and supervisors, employees, contractors and sub-contractors, designers, suppliers and manufacturers all have responsibility in workplace health and safety.

What are the employer's general duties in terms of Section 2 of the MHSa?

If you own and are working a mine and have people working for you, you are an employer and MHSa requires you to provide and maintain as far as is reasonably practicable for the people who work for you a work environment that is safe and without risks to health (Section 2 of the MHSa).

Several sections of the MHSa state the various things you must do to meet your general obligation to provide a healthy and safe work environment. Remember, if you use the services of sub-contractors, you have the same responsibility for the subcontractors and their employees as for your employees. You must ensure that their actions do not adversely affect the health and safety of your employees and others. You must also involve the people who work for you in health and safety at the mine. MHSa requires you to meet your general duty in health and safety at the mine by doing the following:

Duties of employers to provide a healthy and safe workplace

You can make sure your workplace is healthy and safe by carrying out the following duties:

- Appointing a manager to manage workplace health and safety.
- Put in place a structure for workplace health and safety responsibilities and accountability.
- Identifying hazards, assessing their risks and removing or reducing them.
- Ensuring adequate supply of health and safety equipment and facilities.
- Staff mine taking into consideration health and safety.
- Establish health and safety policy.
- Identify, assess and control hazards as far as you reasonably can so that your employees and other people at work are healthy and safe.
- Investigate and keep a record of incidents, accidents, near-misses and cases of ill-health.
- Check the health of people working near physical hazards such as noise, radiation and hazardous substances including chemicals and biological agents through medical surveillance and make sure they receive the results. MHSa Regulations (9.2 (1)) also state that the employer must ensure that the exposure of workers to health hazards such as radiation, noise is kept below the occupational exposure limits by carry out occupational hygiene measurements.
- Develop an use safe work procedures such as mandatory codes of practice relating to special hazards required by MHSa.
- Make sure you put in place emergency procedures.
- Make sure that environmental conditions of the workplace are suitable for work by:
 - Ensuring that work areas are clean and good hygiene is maintained.
 - Putting proper and appropriate lighting for workers to work and move about safely.
 - Provide good ventilation systems and control temperatures and humidity at work so that workers can work comfortably.
 - Make sure you control atmospheric hazards such as dust as close to their source as possible.
- Provide sufficient and appropriate welfare facilities separate for male and female workers in the workplace.
- Provide health and safety training and supervision.
- Keep health and safety records.

Additional duties of the mine owner or employer if you hire the services of other companies

As a mine owner in event that you hire another company or a self-employed person to carry certain activities at the mine, e.g. construction or drilling work, you are a contractor and are responsible for the health and safety of their workforce. The external company you hired is a sub-contractor.

You have the following additional responsibilities:

- Put in place a policy of selecting subcontractors based on their health and safety performance and their capacity to manage safety.
- You must put in place a clear system, which shows how you and the subcontractor will cooperate in the management of health and safety during the contract period. You should indicate who will be responsible for what.
- Provide the subcontractor adequate information about the hazards of your workplace that are completely and directly under your control and the measures in place to control them.
- The sub-contractor will normally be required to take responsibility for hazards that are under their direct and complete control.
- Appoint a person who will coordinate the health and safety activities of your workforce and that of the subcontractor and make sure they know the person and understand his role.
- You will need to check on an on-going basis the performance of subcontractors and whether they are meeting legal requirements and make corrections where necessary.

Does the employer have a duty in health and safety toward members of the public?

The health and safety of visitors, members of the public, your neighbours and surrounding communities must not be adversely affected by your business activities (for example, you must not pollute the environment of surrounding communities).

General duties and rights of employees in health and safety

Section 22 of the MHSa requires employees to take reasonable care to protect their own health and safety and that of others who may be affected by what they do (their actions) or fail to do (omissions or inaction). The others may be their fellow workers, visitors or members of the public.

How can your employees meet their general duty under MHSa?

Your employees can meet their responsibility for health and safety at the mine by helping you to ensure a healthy and safe workplace and taking part in building your health and safety management system.

Employees should ensure a healthy and safe workplace by:

- Keeping themselves and others healthy and safe at work.
- Following all health and safety requirements for their job and using personal protective clothing and equipment provided by the employer.
- Helping new fellow workers and visitors to understand health and safety rules and why they are there.

- Cooperating with safety representatives and committees in health and safety matters and participating fully in workplace health and safety by putting forward concerns and suggestions or solutions.
- Reporting hazardous and other incidents at work so that the employer can investigate them and take action to prevent them from happening again.
- Reporting any unsafe conditions, practices, PPE or insufficient information in a timely manner so that the employer can have them fixed or corrected.
- Making sure to avoid causing harm to another person, for example through their own tiredness, intoxication with alcohol or drugs, stress or by taking risks. Ensure that your employees feel free to tell you or their representatives if they are tired or in a stressful state.
- Your employee can refuse work that he/she thinks can cause harm that is far more than the accepted level or if the health and safety representative responsible for that work area directs the employee to stop work and leave the area. As the employer, your manager must consult with the health and safety committee to put in place procedures for resolving such issues (Section 23 of the MHSa).

Employees should take part in building the workplace health and safety management system

Employees have wide knowledge and experience in their work and together with their representatives can help the employer develop and put into practice your health and safety management system so that it works well. A good health and safety system will enable employees know who to take their complaints to and be certain that they will receive an answer. A good system will take employees' suggestions seriously. It is your employees that face health and safety issues on a daily basis and this means that they can contribute to the development and running of your health and safety system. Employees can do so in the following ways:

- They elect their health and safety representatives or members of the health and safety committee.
- They can identify hazards in their work areas.
- They can conduct workplace health and safety inspections.
- The employer must adopt recommendations of their representatives, i.e. health and safety representatives and health and safety committee or if this cannot be done, reasons must be given in writing why the recommendations cannot be adopted.
- Employees can use the knowledge, expertise and experience of their job to find solutions to health and safety problems and keep the workplace healthy and safe.

What are other duties of employees?

Employees need to comply with the requirements of MHSa and Regulations and they have the following responsibilities: They must:

- Understand and follow MHSa requirements and site health and safety policies.
- Follow safe work procedures.
- Use safety clothing and equipment provided and take care of health and safety facilities (Section 22 of the MHSa).
- Report accidents, illnesses and dangerous occurrences immediately.
- Report unsafe acts, conditions or hazards.
- Work and act in a safe manner and also help fellow workers to work and act in a safe manner.

What are the responsibilities of Senior Manager(s) appointed under Section 3 of the MHSa?

The MHSa requires the owner of a mine to appoint a senior manager or managers whose functions include ensuring health and safety at the mine. Such appointments do not relieve you, the owner from the workplace health and safety responsibilities imposed on you by MHSa or other laws. The manager(s) is then charged with the responsibility for meeting the MHSa requirements on your behalf by:

- Providing and maintaining a working environment at the mine that is safe and without risk to health.
- Ensuring that the legal requirements of MHSa are met.
- Putting in place an effective health and safety programme taking into account the views of the health and safety committee.
- Providing time, money, equipment and people including competent line managers and supervisors to put the programme into practice.
- Staffing the mine taking into consideration health and safety; for example, considering their training and capabilities in health and safety before assigning tasks to them.
- Making sure that workers have the information, instruction, training and supervision by competent persons to enable them become familiar with workplace hazards and work safely.
- Providing adequate supply of health and safety equipment including PPE, medical and first aid facilities.
- Making sure line managers and supervisors are trained, supported with the right resources and also held answerable for meeting their health and safety responsibilities under MHSa.
- Making arrangements for worker consultation including the election of safety representatives, setting up the health and safety committee and providing them time and means to carry out their functions successfully.
- Developing health and safety policies and procedures such as codes of practice and making arrangements to put them into practice, monitoring and reviewing them.
- Putting in place an effective system for identifying hazards, assessing and controlling their risks to health and safety, keeping records and make it easy for workers to check the records.
- Investigating accidents, cases of serious illness and any incident that is a danger to the health of people at work. Make sure employees or their representatives are consulted and an Inspector may be required to take part in the investigation.
- Conducting occupational hygiene measurements of the exposure levels of workers at the mine, for example, noise, radiation, temperature and humidity levels.
- Conducting medical surveillance of employees who are exposed to dangerous substances including coal and silica dusts, asbestos, chemicals and biological agents, and physical hazards such as noise and radiation.

What are the responsibilities of line managers and supervisors?

The MHSa allows you to appoint persons and provide them with the means to meet the requirements of the Act. The line managers and supervisors you appoint are closest the employees and provide them practical assistance to meet your responsibilities under MHSa. Line managers and supervisors fulfil the following functions:

- They make sure they understand MHSa requirements and ensure that employees comply with them.

- Assist in developing and putting into practice your health and safety policies and procedures, making sure that they are followed.
- Make sure hazards are identified and proper steps taken to remove or reduce the risks.
- Assist with the investigation of accidents, cases of illness and dangerous occurrences and prepare reports for senior management.
- Inspect work areas and help to correct unsafe acts of employees and conditions.
- Cooperate with safety representatives and committees and help them to do their work properly and respond to issues raised by them.
- Instruct and coach workers to follow safe work procedures.
- Ensure equipment are maintained in good order and operated only by authorized and competent employees.
- Understand emergency procedures and make sure that workers follow them.
- Make sure workers are provided with suitable PPE and they are used and stored properly.
- Make sure that chemical and biological substances at the mine are safely handled, stored and disposed of as required.

What are the responsibilities of health and safety coordinators?

If you as the employer have hired a health and safety officer to manage health safety activities at the mine, you need to specify the functions, which may include:

- Providing assistance for everyone to fulfil his or her health and safety functions properly.
- Working with the health and safety committee and helping them to carry out their duties properly.
- Providing technical support for the health and safety programmes put in place to ensure a healthy and safe workplace.
- Linking all departments so that they work smoothly among themselves and coordinate their health and safety activities.
- Providing advice to managers, supervisors and workers on health and safety issues at work.
- Helping in the planning, coordination, delivery and checking of training programmes at the mine.
- Collecting and analysing information on health and safety such as accident and ill-health statistics and analysing them to establish trends that will help make decisions about improvements in certain areas.
- Attending management meetings to give reports and advice on health and safety performance.
- Carrying out research on specific issues.

What are the duties of suppliers and manufacturers in health and safety?

Suppliers and manufacturers also have responsibility for health and safety under the MSHA which is similar to the general duty that applies to the owner of a mine or employer. Section 21 of the MSHA states that any person who designs, manufactures, repairs, imports or supplies any article for use at a mine must make sure, as far as is reasonably practicable that the article is safe and without risk to health when used properly and in addition complies with all MSHA requirements. Hence suppliers and manufacturers must:

- Supply products or installations that are safe and without risk to health when used properly according to the supplier's or manufacturer's instructions.

- Provide information about their hazards and risks and instructions for the safe use of the products including assembling and disassembling. For example, if you buy chemicals for use at the mine the supplier must provide the manufacturer's safety data sheet (MSDS) which tells you the hazards of the chemical, the effects on your body or health and what to do in case someone is exposed to it by breathing it in, swallowing it or touching the skin, etc.
- Supply products or installations that complied with ergonomic principles (making them fit the physical and mental abilities of the workers who will use or work with them) during manufacture, erection or installation or at the design phase.
- Must know and understand MHSA and regulatory requirements and follow them.

What are the duties of sub-contractors?

If you are a mine owner and you employ the services of a sub-contractor or self-employed person, they also have duties to make sure that their activities do not adversely affect their own health and safety including their workers and the health and safety of others at the mine. They must:

- Obtain from you the employer a list of their health and safety responsibilities for their activities which may affect your workers.
- Carry out their work in such a way that does not present a danger to the health and safety of anyone in the mine.
- Cooperate with you the contractor or client and other subcontractors and self-employed persons that may be working on site including your health and safety committees to protect the health and safety of everyone in the workplace.
- Know and understand the parts of the employer's health and safety programme that applies to them.
- Give you, your health and safety committee and other subcontractors or self-employed any information in their possession about anything that could adversely affect the health and safety of other people in the mine.
- Have good knowledge of MHSA and regulatory requirements and follow them.

How can the employer make sure everyone knows his or her health and safety duties at work?

Employers, supervisors and workers are legally responsible for health and safety at work under MHSA and Regulations. This means that everyone is individually answerable or accountable for carrying out their responsibilities. As the employer, you have greater control over your business and therefore greater authority to make decisions. The greater the authority, the greater the responsibility and therefore the greater responsibility for health and safety at work rests with the employer. There are general and specific ways to make everyone know and perform their duties in workplace health and safety.

General things you can do to make people working for you know and fulfil their health and safety duties:

- Make sure you treat health and safety as you do any other business activity by assigning duties as required.
- Consider health and safety as part and parcel of each job and not as an extra element. You do this by including responsibility for health and safety in all job descriptions in your workplace.
- Make sure you have a system to hold the senior manager accountable for the management of health and safety at the mine and managers and supervisors

accountable for putting into practice each element of your health and safety programme for which they are responsible.

The more specific things to do to make everyone know their duties and fulfil them

Prepare a statement, which shows the responsibilities and accountability for each element of your health and safety programme. You should:

- a) For every element of your health and safety programme allocate the specific responsibilities in writing and naming the person; for example, name the employee responsible for obtaining and maintaining the supply of PPE, the person in charge of maintaining work equipment, etc. In more general terms, assign the health and safety responsibilities and accountability of senior manager, managers, supervisors, workers, subcontractors, suppliers, etc.
- b) Specify a monitoring system to check whether everyone is fulfilling his or her role as required.
- c) State the disciplinary measures you will take if people fail to carry out their health and safety duties.
- d) Make sure you consulted the health and safety committee and took their views into account.
- e) Keep a record of the statement and communicate with everyone concerned.

Other things you should do to ensure that people fulfil their responsibilities and meet the requirements of MHSa (Section 7)

- Make sure everyone knows his or her responsibilities.
- Make sure the persons have the authority or power to make decisions, time, resources and the opportunity to fulfil the responsibilities you have assigned to them.
- Make sure that they have the right knowledge, skills and experience to carry out their responsibilities. You can assess their training needs and provide them the required training.

Legal appointments

All roles and responsibilities including accountability are arrangements that are intended to make sure that the MHSa requirements are met and the mine operates in a safe and healthy environment. As the owner of a mine, you must appoint people to fulfil these functions. These appointments are called legal appointments because they are required by law-the MHSa.

Section 3(1) of the MHSa says that the owner of a mine must appoint one or more managers who are qualified and competent and provide them the means to carry out successfully their functions including maintaining health and safety at the mine. However, the owner of a mine must perform the functions of a manager if one cannot be appointed and may at any time delegate those functions to another person without taking away any of the duties of the owner under the MHSa.

Section 4 (1) of the MHSa says that the owner of a mine can appoint other persons and provide them with the means to carry out their functions properly and notify the Chief Inspector of Mines of such appointments in a correct form (*see Appendix D*). Such appointments could include:

- The General Manager
- Other managers (sectional/technical), Heads of department, line managers)

- Various Engineers
- Mine Foreman
- Plant foremen
- Chief fire officer, etc.

6.3 Guidelines for establishing cooperation through consultation and communication

Why consult and cooperate with the people who work for you?

You need the commitment and participation of the people who work for you to make your health and safety programme work properly. If you are a small organisation, you may not afford the services of expert health and safety consultants as do larger companies like Anglo American. Therefore, you need to rely more on your employees and their vast knowledge and practical experience to support your efforts to protect workers and prevent workplace injuries and ill-health. You need the support of all your employees from top managers down to newly hired workers.

You can involve your employees individually or by working with their representatives and the health and safety committee. It is a MSHA requirement to consult your employees in health and safety matters individually or through their health and safety representatives and committees. If you want your workers to actively participate in reporting hazards and suggesting solutions to improve health and safety performance, you must make your employees understand that they will not be penalised. They must understand and have confidence that you will take their concerns seriously and implement their suggestions where necessary. Always remember that the deeds of managers and supervisors speak louder than words.

Arrangements to involve and consult employees in health and safety matters

You can gain support and active participation of your employees in health and safety matters at the mine by:

- Putting in place health and safety representatives if you employ 20 or more workers.
- Putting in place a health and safety committee or more if you employ 100 or more workers.
- Consulting employees directly.
- Putting in place procedures to encourage employees to come forward with their health and safety concerns.
- Putting in place arrangements such as suggestion boxes to encourage employees to make suggestions that can improve health and safety at the mine.
- Making sure you have procedures to protect workers from punishment for coming forward with concerns and making suggestions.
- Putting in place procedures to act quickly on concerns and suggestions and to inform workers about the actions you have taken and progress made in putting them into practice.

What the law says?

The general rule is that as the mine owner or employer, you must consult the people who work for you in matters concerning their own health and safety and that of others that may be in your workplace or affected by your activities. For example Section 8(2) of the MSHA says the Manager must consult the health and safety committee in the preparation,

implementation and maintenance of health and safety policies as well as the mandatory codes of practices and other procedures (Section 9 (4) of the MSHA).

Employees can participate actively in workplace health and safety through the health and safety representatives of their designated work places and the health and safety committee. The MSHA establishes a workplace consultative framework including health and safety representatives and health and safety committees through which employers can consult and involve workers in health and safety matters at the mine. Their roles and responsibilities and the ways they are set up and carry out their functions are laid down in Chapter 3 of the MSHA and Chapter 6 of the Regulations.

Section 25 of the MSHA says that if you own a mine and you employ 20 or more workers you must have a health and safety representative for each shift at each designated working place (DWP) at the mine. If you employ 100 or more workers, you must have one or more health and safety committees.

How to establish a health and safety representative committee at the mine?

Negotiate a collective agreement

Once you own a mine and determine you must have in place one or more health and safety representatives, you need to negotiate a collective agreement with the representative trade union of your employees. If there is no representative trade union, you can negotiate with the union that has some members at your mine and failing, you must consult employees or their elected representatives.

The collective agreement is important in reaching agreement between the employer and the union on who the health and safety representatives will represent, how they will be elected and authorized to work, their duties and rights, the support systems they will need to carry out their work properly, their terms of office and manner of replacing them, etc. Specifically, S.26 of the MSHA states that the collective agreement should determine:

- The designated working places (DWP).
- The number of full-time health and safety representatives.
- The procedures for electing and appointing the health and safety representative.
- The terms of office and the circumstances and manner they may be removed from office.
- The manner of filling vacancies.
- The manner in which they will perform their functions in terms of the MSHA.
- The procedures for exercising their right to order halt or withdrawal from work where conditions present serious danger to employees.
- The circumstance and manner in which meeting will be held.
- The facilities and support which must be provided to the health and safety representatives to enable them work properly.
- The arrangements for training the health and safety representatives.
- The procedure for conciliation and arbitration of disputes.

The designated working places

Designated working places are the foundation of the framework to consult your employees. A designated working place consists of a group of people working in a specific work area that is covered by a health and safety representative. It is a work area where employees have similar health and safety concerns, share the same conditions of work and a health and safety representative elected from amongst them will understand their problems, serve their

health and safety needs better and also be readily available when needed by his/her fellow workers. Each DWP has one health and safety representative.

MHSA says that DWPs are first agreed in the collective agreement and are thereafter designated by the manager. In the absence of an agreement, the manager designates them, making sure that every working place at the mine is designated; no representative is responsible for more than 100 employees; and for more than 50 employees if the DWP includes separate working places. A workplace can have one or more DWPs but the number has to be negotiated. When designating DWPs, the following things must be considered:

- How many employees you have at the mine?
- What are your shift arrangements (remember the law says if you are employing 20 or more workers per shift)?
- How many groupings of workers do you have doing the same or similar types of work?
- In which area of the workplace is each type of work done?
- What is the type of work that is being done at the workplace?
- What are the hazards and risks at the workplace?

How to elect and install a health and safety representative?

Each DWP elects a health and safety representative from among its members. A health and safety representative is therefore the voice of the DWP in health and safety matters.

Conditions a member of a DWP must meet to become a health and safety representative

Any worker who is a member of a DWP can be elected a health and safety representative. However, MHSA sets certain qualifications a worker standing for election as a health and safety representative must meet. The person must:

- Be employed full-time in the DWP.
- Know the conditions and activities at the DWP.
- Have other qualifications that may have been agreed by the health and safety committee or prescribed by law.

Election of a health and safety representative at a DWP

All members of a DWP can vote and every employee has one vote when electing a health and safety representative. The election is supervised by an election officer who declares a candidate elected as a health and safety representative for a shift at a DWP if he/she is the only candidate nominated. However, an election must be held if two or more candidates are nominated and 50% or more of employees working on the same shift at the DWP vote during the election. A fresh election must be held if less than 50% vote; the result of the fresh election will be valid whether or not 50% vote. Once counting is complete, results must be announced to the employees.

Rights and powers of health and safety representatives

The most important function of the health and safety representative is to defend the health and safety interests of the workers in his/her DWP. Health and safety representatives work only for their DWP but do not remain only within the location of their DWP. They are allowed to go to any area where any member of their DWP is working. Health and safety representatives fulfil the following functions:

- They represent their members on all health and safety matters.
- They identify hazards and assess the risks and can propose solutions.
- Make recommendations on health and safety matters to the Manager or health and safety committee.
- Direct employees to leave or stop work if the representative reasonably believes the circumstances in that work area pose serious danger to the health and safety of employees working there.
- Request information and reports from the Inspector of mines and also inspect official documents.
- Attend meetings of the health and safety committee.
- Request an Inspector of mines to conduct investigation of serious health and safety breaches.
- Participate in health and safety consultations and inspections with the Manager or person acting on the Manager's behalf.
- Participate in internal health and safety audit.
- Investigate complaints about health and safety by employees at his/her DWP.
- Participate in the investigation of accidents, incidents and other dangerous occurrences.

How the employer can support the work of the health and safety representative?

The work of health and safety representatives may require them to develop special skills and be able to understand and negotiate difficult health and safety issues. Hence, they need training as well as information and time to fulfil their function without affecting their pay. MHSa says that as the employer, you must support the health and safety representatives in the following ways to enable them work properly:

- Make sure that you pay a full-time health and safety representative a wage at least equal to the one he/she earned before election and appointment as full-time representative.
- The Manager must provide enough time and facilities for employees to meet monthly with their representatives to discuss the health and safety conditions of their DWPs and receive reports on how representatives are carrying out their duties.
- The Manager must provide health and safety representatives with time and facilities needed to do their work properly.
- The health and safety representatives must be trained to do their job and given time off when needed to do training without losing their pay.
- Once the term of office of a health and safety representative expires or is ended, he/she should be provided a job on the same position or better before he/she became a full-time health and safety representative.

How to establish a health and safety committee?

Section 25 (2) of the MHSa stipulates that if you are the owner of a mine and you employ 100 or more workers, you must establish one or more health and safety committees. Further, the MHSa requires you to enter negotiations with the representative trade union at the mine to conclude a collective agreement establishing the committee. The Manager must consult with other registered trade unions which have members at the mine before negotiating the collective agreement, or with employees if there is no representative trade union and no members of a registered trade union. However, the establishment of the health and safety committee can be negotiated at the same time as the negotiations to put in place the health and safety representatives. Sections 33-40 read with other sections of MHSa specify how

committees are to be constituted, their functions and support systems required to enable them carry out those functions properly.

What is a health and safety committee?

A health and safety committee is the second structure in the framework for consultation in health and safety at the mine established by MHSa. It is a group of people comprising representatives of employees from designated workplaces and the mine appointed by their health and safety representatives and management representatives appointed by the Manager. The main task of the health and safety committee is to discuss and find solutions to health and safety issues at the mine including planning and development of health and safety policies and procedures.

The collective agreement that has been negotiated and accepted should specify the following:

- The number of health and safety committees to be established in the mine.
- The designated workplaces (DWP) for which they will be responsible.
- The number of representatives from management and employees that will sit on the committee.
- The terms of office of members of the committee and the circumstance and manner in which they may be removed from office.
- How vacancies will be filled.
- Conditions for holding meetings and how meetings will be conducted.
- The facilities and kind of help that must be provided by management to the health and safety committee to do its work.
- How disputes arising from putting into practice the collective agreement establishing the committee will be resolved.

The health and safety committee must therefore be established following these terms.

Things to be considered when setting up a health and safety committee

Negotiations between the employer and employees should aim at putting in place a health and safety committee that suits the needs of the mine. The following things will help the people taking part in the negotiations determine what suits the particular workplace:

- What is the size of the workplace, for example the number of workers it employs, small-scale, medium or large-scale?
- What is the type of work carried out at the mine? For example, aggregate quarrying, colliery, mining coal, cement, etc.
- Whether work is arranged in shifts.
- The structure of the QWPs.
- The hazards and risks at the mine.

Composition of the health and safety committee

MHSa specify the minimum requirements relating to the composition of health and safety committees and their rights and duties but the details must be thrashed out when negotiating the collective agreement. The employees representatives that sit on the committee must broadly represent the DWP and all the employees at the mine. If your workplace is large and has several DWP then you may need to set up more than one health and safety committee and ensure that they cooperate with each other and coordinate their activities and work together.

The MHSa requires that the health and safety committee should have at least 4 employees representatives appointed by their health and safety representatives and a number of management representatives appointed by the Manager which is equal to or less than the number of employee representatives. Health and safety representatives appoint the employees representatives who sit on the committee from their DWPs. Most of the employee's representatives sitting on the committee are themselves health and safety representatives given that not more than 2 of them can be full-time workers who are not health and safety representatives. This is a way of ensuring that health and safety management does not affect production by taking up significant amount of operational from too many workers. Employees' representatives bring to the committee knowledge of work processes, workplace hazards and risks. This means that employees' representatives on the committee who are not health and safety representatives must coordinate their activities with the health and safety representatives sitting on the committee.

The Manager appoints management representatives from among persons who take part in developing and putting into practice health and safety policies and procedures including line managers, supervisors, human resource and health and safety officers at the mine. These bring to the committee much needed information on policy, production needs, work processes, plant, machinery and equipment.

Why senior management should be represented on the health and safety committee?

Representatives of senior management sitting on health and safety committee provide it with authority so that it is able to:

- Take decisions instead of referring matters to other levels of management hierarchy.
- Put the decisions into practice without fear of being dissolved or members facing reprisals.

The MHSa arrangements for health and safety committees to work properly

According to the MHSa every health and safety committee must make the following arrangements, which will facilitate meetings and in carrying out its responsibilities, the committee must:

- Elect two chairpersons, one elected by employees' representatives from their numbers sitting on the committee and the other elected by management representatives from their numbers on the committee. The two chairpersons alternate in presiding the health and safety committee.
- The health and safety committee should meet at least once every month.
- The health and safety committee can develop and adopt its own internal rules and procedures to enable it do its work properly.
- The committee can invite other persons to attend its meetings and participate in its proceedings.

The rights and powers of the health and safety committee

Section 36 of the MHSa states the rights and powers of health and safety committees but the actual work they can do in practice is determined in the collective agreement during negotiations. This is to ensure that the work of the health and safety committee does not duplicate that of the health and safety representative. Their functions should complement each other. The health and safety committee may:

- Represent employees on all health and safety matters.
- Participate in consultations with the Health and Safety advisory Council.
- Request the Chief Inspector of Mines to review any Code of practice.
- Request any useful information from any person who is required by MHSa to provide that kind of information.
- Request an Inspector to investigate serious health and safety contraventions.

What are the functions of health and safety committee?

When negotiating the collective agreement, members agree on the objectives of the committee from which the functions of the committee emerge. Health and safety committees carry out the following functions; they can:

- Assist in developing health and safety policies and procedures including procedures for handling health and safety issues, for example halting work in an area where conditions present a danger to health and safety of employees working there.
- Receive and discuss reports made by health and safety representatives or management representatives on specific health and safety issues, for example, emergency procedures, chemical storage, dust and noise control.
- Check whether the management of workplace hazards and risks is meeting targets and make suggestions for improvement.
- Examine accident reports and ill-health records and make suggestions on how to prevent them.
- Obtain and distribute new health and safety legislation, e.g. amendments to MHSa and regulations and also make recommendations on changes in the health and safety legislation to the Health and Safety Advisory Council.
- Assist in identifying and examining health and safety training needs of employees and developing training programmes for them.
- Examine periodic audit reports and make recommendations to management to carry out improvements in health and safety in the workplace.

How can management encourage and support the work of the health and safety committee?

The health and safety committee cannot do its work well if senior management does not support it. This is the reason why Section 37 of the MHSa states that it is the duty of the Manager to support the work of the health and safety committee by providing it with facilities and assistance to carry out its functions. The Manager must also give a copy of the annual health and safety report and other materials to the committee so that it is aware of the overall health and safety performance at the mine. Other ways senior management can support the health and safety committee include:

- Making sure that management representatives on the committee participate actively in committee activities.
- Give the committee necessary information about work processes and the nature of the work environment.
- Explain the role of the committee to everyone and make sure workers know how to support the committee in its work.
- Make sure the committee sufficiently represents shift workers and their designated working places which have specific health and safety concerns.
- Provide sufficient training, resources and time for the committee to work properly.
- Make sure you facilitate easy communication between the committee, employer and workers.

- Make sure you consult the committee in health and safety matters as required by the MHSA.
- Encourage the committee to work well by acting quickly on concerns and hazards reported to you by the committee and by acting quickly on their recommendations and giving them a report on your action.
- Giving praise and endorse the good examples of work done by the committee.
- Make sure you regularly check how well the committee is working.

Ways of communicating health and safety information

The purpose of communication is to make sure that all health and safety messages are received and understood by everyone at the mine. Managers, supervisors, health and safety representatives and committees must communicate information about health and safety at the mine regularly. This can be done through:

- Induction training for new employees recruited to work at the mine.
- Daily tool box talks and safety briefings.
- Scheduled meetings of health and safety representatives with their DWP employees.
- Awareness campaigns in which employees are sensitized on specific issues such workplace HIV/AIDS, alcohol and drug abuse at work, violence and harassment, etc.
- Sending messages by email or intranet systems, smaller mines may not afford these systems which are expensive and need expertise in information technology to make them run properly.
- Posting information, for example Health and safety policies, procedures, annual reports, accident and lost-time injury summaries. These are posted in high employees' traffic areas on notice or bulletin boards. Messages should be in simple if possible local language which most workers speak and understand.
- Regularly checking each and every board to make sure that all health and safety information has been posted and updated.

What should be posted?

Postings may include but not limited to:

- General health and safety policy statement
- The Mine Health and Safety Act (No. 29 of 1996)
- DME/DMR health and safety instructions or explanatory notes

First Aid and emergency information should include:

- First aider's names
- Emergency evacuation plan
- Emergency services numbers

Reports

- Management workplace health and safety inspection reports.
- Health and safety surveys and assessments, e.g. survey whether health and safety training was effective; a survey of health and safety culture at the mine, etc.
- DME and Inspector of mining orders.

Health and safety representatives and committee

- Workplace health and safety inspections.
- Minutes of the health and safety committee.
- Names of health and safety committee members.
- Names and photos of health and safety representatives.

6.4 Guidelines for developing and implementing an occupational health and safety plan

What is an occupational health and safety plan (programme)?

The occupational health and safety management plan consists of the arrangements which the mine owner or employer has put in place to implement the objectives of the general health and safety policy and to comply with the requirements of the MHSA and Regulations.

Who is responsible for the implementation of the programme?

The MHSA establishes an internal responsibility system that encourages everyone in the workplace or at every mine to work together to put into practice all health and safety arrangements to prevent injuries and ill-health, making the mine a safe and healthy place to be. Everyone from General Manager down to the newest person employed at the mine must participate actively in health and safety matters as a shared responsibility and make good practice an integral part of everything they do at work. As the employer, the mine owner has the highest degree of control over the workplace and operations and therefore greater or the most responsibility for making sure that the programmes put in place to make the workplace safe and healthy are properly implemented to meet set objectives.

What arrangements should be included in the occupational health and safety management plan?

The MHSA does not devote a specific section to stating the various elements that a health and safety management plan should comprise but these can be obtained or reasoned out from the logical sequence of the requirements to which you must comply to make the work environment safe and healthy as far as you reasonably can. These elements include:

- Risk management (hazard identification, risk assessment and control).
- Arrangements for monitoring and evaluating health and safety performance (safety tours, workplace inspections, audits).
- Investigation and reporting of accidents, dangerous occurrences and ill-health.
- Arrangements for carrying out environmental control including occupational hygiene measurements for hazards such as noise, dust, radiation, vibration, asbestos) and waste disposal.
- Arrangements for medical surveillance.
- Safe systems of work (including safe work procedures, permit to work, method statements).
- Procedures for dealing with emergencies such as fire, explosions, inrush.
- Arrangements for managing contactors and visitors.
- Purchasing arrangements.
- Arrangements for maintenance of plant, machinery and equipment.
- Arrangements for the selection, provision and use of PPE
- Arrangements for welfare facilities.

- Arrangements for consultation and communication through health and safety representatives and health and safety committees.
- Arrangements to control exposure to prescribed hazards through mandatory codes of practice.
- Documentation.

The Risk Management Programme

What is the risk management process?

Managing risk(s) at the mine is the foundation of the entire health and safety management process. The MHSa requires the owner of a mine to make sure that the work environment is safe and healthy by identifying hazards and removing them or controlling their risks as far as is reasonably practicable (Section 11 of the MHSa). The risk management process is a systematic method in which you apply your health and safety policies and procedures including good practices to identify hazards, look closely at the risks of the hazard and decide what the impact or consequences of the risk are and then do something to remove the risk or reduce it. Risk management requires that you spot the hazards, work out the risks to determine which ones are so high that you need to handle first, then you consider the measures you already had in place to control the risks and decide whether you can remove the hazard altogether or make additional changes to reduce the risk of injury, ill-health or damage to property and the environment.

You can apply the risk management process to:

- The whole workplace or mine, for example when conducting your initial baseline hazard identification and risk assessment.
- A specific job In which case you break down the job into steps, identify the hazards of each step, assess the risks, prioritise them and develop measures to remove or control them (job safety analysis).
- A piece of machinery of equipment, for example for the installation and use of a scraper winch or mono winch (rope); or when you need to introduce a new equipment (this is a more specific and issue based risk assessment).
- A specific activity at the mine, for example rock blasting or shot firing of explosives.

This section of the guidelines provides a basic understanding of the process you need to follow when identifying hazards, assessing their risks, prioritising them in their order of importance and determining how to remove or control them. Line managers, supervisors, health and safety representatives and members of health and safety committee can use the material to help them identify and control risks to prevent or reduce injuries and ill-health at work.

What the MHSa says about the risk management process?

Section 11 of the MHSa states the requirements for you to systematically identify hazards at the mine, work out their risks, and decide the ones you need to control first, find ways to remove them or reduce them and make sure you assign people to implement those measures, check and make changes when necessary. The MHSa requires you to:

1) Identify hazards at the mine and assess their risks (Section 11 (1) of the MHSa)

- Identify hazards at the mine (there will be common hazards that correspond to the nature of your operations, for example an open cast hard rock quarry and you may have prescribed hazards such as rock fall and activity such as

the need to set up occupational health service for which MHSa requires you to develop and implement mandatory codes of practice).

- Assess the risks of the hazards you have identified so that you can list them in their order of importance which then shows you which hazards are more serious and need you to attend to them first. The exercise will give you a risk profile.
- Keep a written record of the significant hazards and risks (the risk profile) and make sure you allow employees, their representatives, members of health and safety committee or the Inspector of mines to inspect it when needed.

2) Control risks of the hazards you identified (Section 11 (2) of the MHSa)

The MHSa also tells you ways in which you can go about controlling the risks including:

- Changing the way you organise your work
- Preparing safe systems of work, for example, method statements, permit to work for high risk tasks like confined space entry, work on power generators, mandatory code of practice, etc.
- Examining and reviewing existing control measures
- Using the hierarchy of controls
- Putting in place a programme to check the controls whether they are still suitable and are working properly so changes can be made if needed to improve them

3) Implement risks controls (Section 11 (3) of the MHSa)

MHSa requires you to put into practice the measures you have put in place to remove or reduce the risks. Guided by the risk profile of the mine in which you ranked the risks by showing those of greatest concern, you should prepare an action plan to implement each measure. The action plan shows who will do what and by what time or date and when the activity will be reviewed.

4) Periodically review hazards, risks and controls (Section 11 (4))

MHSa requires you to regularly check your hazard identification, risk assessments and controls to make sure that they are still suitable and make changes if needed. You must consult with your health and safety committee, health and safety representatives or employees.

From the general spirit of MHSa, when conducting a hazard identification and risk assessment, you should be guided by the following principles:

- Hazard identification, risk assessment and control is a systematic process requiring application of your health and safety policies, procedures and good practices to identify, assess and control risks in an orderly manner.
- Hazard identification, risk assessment and control constitute a continuous or on-going process and not a one-off exercise. It should be reviewed when conditions change or if a winch breaks down and has to be repaired, a risk assessment should be carried out for the activity, making risk assessment part and parcel of every day work.
- You must take into account existing controls and review their suitability.
- Consult with your employees, their representatives and health and safety committee.

- The entire risk assessment process should cover all aspects of the activity being assessed.
- Take into consideration non-routine operations such as plant, machinery and equipment maintenance and changes in work methods.

The importance of risk management

Managing risks is the foundation for making the mine a safe and healthy work environment. Most importantly your risk assessment shows you how the risks at the mine line up from the lowest (least important) to the highest (most important). It helps you prioritize risks so you know where to put your money and most effort to prevent the worst types of accidents and cases of ill-health from happening even if you may not be able to stop other types from occurring. Safety does not mean that there are no hazards or risks in the workplace. Safety means that the risks are so low that everyone at work thinks they can work safely. Risk management helps you to know about risks at work and to do something about them to keep the workplace healthy and safe.

Managing risks helps you comply with the key requirement of the MHSa to provide a healthy and safe work environment as far as reasonably practicable by identifying workplace hazards, assessing their risks, controlling and reviewing them regularly.

MHSa requires you to keep records of your significant risks and what you are doing to control them including the people you have assigned to implement the measures. In this way, your managers, supervisors, employees, their representatives, health and safety committee and the Inspector of mines can review the records to keep track of how well you are doing in keeping the mine workplace healthy and safe so you can improve weaknesses and strengthen where you are doing well.

When a hazard identification and risk assessment (HIRA) should be conducted?

Hazard identification and risk assessment and control is a continuous on-going process that you must carry out when:

- You have not conducted a HIRA before, for example during the planning stage to develop your health and safety policy and establish the health and safety management programme. In this case you will need to carry out a baseline HIRA.
- You have identified a hazard, for example a faulty nipple in your conveyor system.
- A change to the workplace occurs, for example you install a new scraper winch or you hire new workers, vulnerable workers including women, or you carry out redundancies.
- After an incident, accident or work-related illness, for example an employee fell over the edge of a bench and sustained a serious injury.
- Periodic HIRAs that have been scheduled.

Preparing for a hazard identification and risk assessment (HIRA)

1) Set up a HIRA team

You must keep in mind that the HIRA process is planned and systematic if you want to achieve good results. This means that you need to plan the exercise by setting up the HIRA team that is representative of management, e.g. supervisors as well as employees-the people that could be exposed. It is a good idea for management and employee team members to be from the DWP where the HIRA is being conducted and should include the

supervisor, health and safety officer or coordinator, health and safety representative, member of the health and safety committee and an expert where necessary.

It is a good idea to develop a HRA procedure in consultation with the health and safety committee to ensure that your HIRAs are conducted in a systematic manner and help you:

- Find hazards at the mine
- Assess the risks of the hazards and prioritise them, listing them in their order of importance
- Determine the control measures using the hierarchy of control as prescribed by MHSa to remove or reduce the risks.
- Implement the control measures by developing an action plan and assigning people to make sure the measures are put into practice.
- Regularly check and make sure that the controls are working well or need to be improved and make the changes needed.

2) Gather important information

The HIRA team will need to gather information that will guide them in identifying hazards, assessing and prioritising their risks and finding the correct measures to control them. The team should:

- Look at MHSa and Regulations and other relevant legislation to know what the law requires you to do.
- Check DMR information sources such as significant incident reports, Codes of practices, Guidelines and guidance notes. Analysing some of these resources may not only identify hazards, particularly prescribed hazards requiring you to develop mandatory codes of practice but will show you how to go about the exercise.
- Check relevant SABS standards and Good practice in the South African mining industry. These are a valuable source of knowledge of specific hazards and current experience in their management. These sources can also help you establish your company risk criteria.
- Determine your company risk criteria. How are you going to determine that a hazard you have identified presents a risk that is a high priority, moderate or low?
- Check your health and safety policies (general and specific policies) and safe work procedures.
- Check the manufacturers' manuals and materials safety data sheets (MSDS), which should tell you the hazards of the equipment or substances you purchase and the precautions you should take to make sure they are used or operated safely.
- You need to look at the Mine and Floor plans including the old and new ones. They give you the layout of the entire mine, the designated work places, transport routes, access and egress.
- Collect and check accident and illness reports and statistics, sources of significant hazards that have happened, their underlying causes and what can best be done to prevent reoccurrence.
- Check inspection reports, which indicate employees' health and safety concerns, identify hazards and recommend solutions to fix the problems.
- Check your internal audit reports and the external audit reports which present an independent view on the performance of components of your occupational health and safety management system and identify weakness you need to pay attention to and fix.

3) Determine your company risk criteria

You agree risk criteria at the beginning of the risk management process, or in advance before the team begin identifying hazards. You need to set the level at which you will consider a risk acceptable, high, moderate or low. Each risk will then be assessed against that level. The acceptable risk level allows you to determine the type of control measures that will enable you control each risk to that acceptable level including what you will do with the remaining (residual) risk, maybe provide PPE.

In deciding on your risk criteria you need to consider important factors such as legal, operational and technical requirements as well as local community sensitivities and public thinking or perceptions. For example, you may assess a risk as low but legal requirements and public feelings can make you increase the level to high priority for that particular working place.

In deciding your risk criteria, you need to make a judgment about the possibility (likelihood) of injury or harm to health, for example whether it is a repeating occurrence, and the potential consequence if an employee became exposed to the hazard, for example whether the person sustained a major injury or permanent disability.

4) Identify hazards

What is a hazard?

A hazard is anything that is likely to cause harm to people and damage to your premises, machinery, equipment and the environment. Hazards could relate to your work environment, for example, slippery and uneven floors, poor lighting and ventilation; substances, machinery, equipment and tools, for example, toxic or harmful chemicals, machines without guards, excessively noisy plant; lack of adequate information, instruction, training and supervision, for example, a new recruit with little or no previous experience; ill-fitting and low quality protective overalls, shoes and gumboots. Examples of hazards common in small scale mining and related activities are shown in table 4.

How to proceed to identify hazards?

It is important that your team should identify all hazards that could cause injury or harm to health of a person no matter how minor the harm. In identifying a hazard you should answer two key questions:

- What could happen?
- How and why it could happen?

To answer these questions you need to examine the information you gathered when planning for the HIRA and at the same time conduct a workplace inspection to see what is happening on the ground. This means you need to:

- Prepare a checklist to make sure that all hazards are identified systematically and put on record
- If necessary, you may have to divide the workplace into sections, for example DWPs, and inspect them separately.
- Look carefully on what is going on, how work is being done (it will not be useful to stay in the office and look at job descriptions and work procedures).

- Pay particular attention to operations that are not routine such as breakdown of machinery and equipment and scheduled maintenance.
- Talk to employees working in the area to get their views about what the hazards are and the risks they present, for example make sure you talk to the operator running the drilling rig to know about the hazards he faces: ventilation in cabin, vibration of sitting, comfort of controls, dust, visibility, etc.
- Pay attention to any changes and interruptions that may have occurred in the workplace: unidentified hazard may have come to light or new hazards were recently introduced by changing work procedure or installing new equipment. If there had been heavy rain down pours, slopes can fail, operating conditions could become unsafe for workers and equipment and the risk of slipping, tripping and falling will increase and machines and equipment can sled and skid as well and can lead to injuries to operators.
- Look at the reports and examine past incidents/accidents and cases if ill-health and check what happened and why and whether these could happen again.

Table 4: Some examples of hazards commonly found in small-scale mining

Activity	Hazard
Surveying and clearance	Fall from heights Thrown from overturning vehicle Struck by falling tree Chain saw vibration
Construction work	Overhead power lines Fall from height Mobile plant out of control Struck by mobile plant
Drilling	Falling from edge of bench Inhalation of dust from drilling operations Noise from drilling equipment Struck by or entrapped in moving or revolving part of drilling equipment WB and HA vibration
Shot firing of explosives in blasting of rock	Misfires, flying rock
Face stability	Rock fall or slide
Loading	Dust Rock falling on operator Plant toppling over if ground uneven Hydraulic system failure of truck Fall when gaining access to operator cabin Electrocution in draglines Failure of wire robes in draglines
Transporting	Brake failure Vehicle movement especially in reverse Rollover Vibrations Dust Noise Lack of visibility from operator position

While in a working place, think about what could go wrong there, can a fire break out at the diesel depot? Can there be inrush following heavy rainfall causing flooding of the mine? Oil and chemical spills or significant rock falls and ground collapse as a result of sudden

instability caused by seismic activity? Identify foreseeable emergencies and prepare for them to prevent or reduce their impact.

You may need to return to the inspection area when a particular activity or task is going on because during your initial inspection some hazards were not visible and missed.

Conduct the risk assessment

You have compiled your hazard list following the identification work. Now you need to know which hazards you must fix first: large risks require urgent action to fix them while minor risks not require handling at all. Moreover management may have limited budget and this may also affect the risks that need to be handled and temporary measures may be taken and more permanent controls provided when money is available. This gives you a good case to actually measure your risks. Remember it is a MSHA requirement to conduct a risk assessment of the hazards you identify. First, you need to understand what the risk of a hazard is.

What is a risk?

Risk is the possibility or likelihood that a person will be harmed by the hazard if he or she is exposed to it and the consequence or impact. The consequence or impact could be the resulting injury or illness, damage to property, plant, equipment and the environment. This means that the risk of a hazard has two elements namely:

The likelihood of a risk happening

The main question you need to answer: ***Who will be exposed to the hazard and for how long?***

Each risk you identify has a chance of happening. Risk likelihood is the chance that the harm from a particular hazard will occur or the frequency (the number of times a loss or harm could occur) if a person is exposed to the hazard. For example, the mine can flood once every 50 years or an operator can cut himself on a specific machine once every week. Hence the harm may be a common or repeating occurrence-happening all the time as when you are exposed to noise or will occur only occasionally.

In determining the likelihood, you should think about how many people are likely to be exposed to each hazard and for how long? If you have a mine hole or excavation without guard or protective rails and operators passing there can fall into the hole, think about how many, maybe most operators in that work area pass by the hole and are exposed. You should also consider the different situations or conditions in the workplace that are likely to increase the likelihood: a change to operations, an inspection taking place, cleaning and maintenance work, servicing and repair work, new recruits without experience, etc.

You can estimate the chance of a risk happening qualitatively by using your own personal judgement, for example, you can judge from what you know about the way the work is done that there is a risk and make an estimate that the risk could almost certainly happen, very likely happen, or could happen occasionally, rarely or never (table 5). You can also estimate the chance of the risk happening using numbers (quantitatively) by determining the number of times the risk or accident has happened, for example once daily, once every two months, etc.

Now you can determine your frequency criteria, by rating the likelihood that the harm will occur in advance qualitatively or quantitatively:

Table 5: Rating the likelihood of a risk

Level	Description	Time frame
Almost certain	Expect it will occur in most cases	Daily
Very likely	Could happen frequently	Every two months
Likely	Could happen occasionally	Once a year
Unlikely	Could happen only rarely	Once every 10 years
Remotely	Could happen but may likely never happen	Never

Consequence of the risk

The main question you need to answer: What will the consequence or impact be if the hazard actually causes an injury or harm to health?

Once the event or harm happens (flood, cut or injury) there could be different degrees of damage. Hence, the cut could be minor at one time or more severe resulting to an amputation of the hand. This has to be taken into account when assessing risk. The flood can lead to people drowning. Hence the consequence of the harm can be a fatality, serious injury, permanent health impairment, machinery damage, minor injury or reversible health effect, lost production time, etc. And the cost of doing something about the risk must be considered to help management decide the steps to take in fixing the problem. For example money restraints can make management to opt for temporary measures to control the problem while waiting to secure money to provide a more permanent fix. Now you can use your own judgement and rate the consequence or severity of each hazard as diagrammatically represented in Table 6 – Rating of the consequence of a risk.

Table 6: Rating of the consequence of a risk

Consequence	Description of the consequence
Fatal injury	Sudden death or death after a long illness
Major injury	Irreversible injury (amputated limb), serious health impairment (permanent paralysis resulting from damage to spinal cord)
Moderate injury	Normally reversible injury or damage to health needing several days off work
Minor injury	Normally very minor injury needing only first aid and not requiring time off work

Determine the severity of the risk

Once you have estimated the likelihood or chance that the risk of each hazard will happen and the consequence of it happening, you must then determine the severity of the risk. You will have to rank the risks in their order of severity, that is, according to how serious is the risk presented by each hazard. You do this by comparing the likelihood and consequence. It is a good idea to do this in a quantitative manner by giving numbers to each level of likelihood and consequence. You obtain the severity of each risk by multiplying likelihood by consequence (likelihood X consequence) as shown in the risk matrix **Table 7 below**. Table 8 provides the description of the risk rating.

Table 7: Basic Risk Matrix (combining likelihood and consequence)

LIKELIHOOD	CONSEQUENCE				
	Negligible 1	Minor 2	Moderate 3	Major 4	Fatal 4
Almost certain 5	5	10	15	20	25
Very likely 4	4	8	12	16	20
Likely 3	3	6	9	12	15
Unlikely 2	2	4	6	8	10
Rarely 1	1	2	3	4	5

(Adapted from HSE)

Table 8: Risk rating description

Severity of risk	Rating range	Colour code
Very High	25	Dark brown
High	15-20	Red
Medium	6-12	Amber
Low	1-5	Green

Calculation Example 1 (Hazard 1 on your checklist)

Take likelihood of 4 (likely) X Consequence of 3 (moderate) = $4 \times 3 = 12$ (amber) Medium risk

Calculation Example 2

Take likelihood of 5 (Almost certain to happen) X consequence of 3 (moderate injury)
 $= 5 \times 3 = 15$ (Red)

This is a high risk.

Rank the risks of the hazards identified

You can use the Matrix to rank the risks in their order of severity and as shown if you assess hazards as almost certain to happen resulting in fatal injuries, these are the most serious hazards and are classified as high risk as shown in Table 4. It is also a good idea to consider the highest rating of 25 as a very high risk which will require immediate action as will be shown below. Situations which you assess as highly unlikely or negligible injury or injury requiring first aid are the least serious and should be classified as low risk.

Control the risks

Your risk ranking according to risk severity also helps you to prioritize your actions to control the risk. They give you an answer to the question which risk requires immediate action and which does not require action at all? For example if you judge that a risk which occurs repeatedly or frequently would result in the death of a person, then you should list it as requiring first ranked action, is unacceptable and work must stop while you take immediate additional control measures to reduce the risk to an acceptable level. This is shown in the simple legend below.

Legend

1st rank action (unacceptable, stop work and take immediate action)

2nd rank action (tolerable, additional controls required as soon as possible (e.g. not later than 24 hours after assessment))

3rd rank action (Tolerable, further measures required to reduce risk to as low as possible (e.g. within 1 week))

Acceptable risk (no action) No further control measures required.

Things to consider when controlling risks

There are some important things you need to consider when controlling risks:

- It is a MSHA requirement to control risks at work; so risks that fail to meet your risk criteria must be controlled. MSHA requires you to remove risks and if not possible to reduce them to as low as is reasonably practicable. This means that your criteria should not be excessively strict.
- Give priority to high level risks by controlling them first.
- You must consider current or existing control measures and see what additional measures are needed to reduce the risk. Going back to the unguarded mine hole or excavation. The existing controls may be that some of the holes are fenced off. You will need to identify the other holes that have not been fenced and fence them off making sure you put signs around them to warn people of the danger.
- Remember that a risk to a hazard can only be eliminated if the hazard is removed and therefore it is a better idea to avoid a risk altogether and to eliminate risks at source if possible rather than using secondary measures.
- Though you may need a minimum of additional controls to handle low level risks, you need to check them at regular intervals to make sure that the risks remain on acceptable levels.

How to control and reduce risks?

The first thing to do is to assess the existing controls for each hazard. Table 9 below will help you assess your controls.

Table 9: Assess your current control measures

Description of measure	Assessment comment	Rate assigned
Check the design of the current control measure and decide whether it:	Needs improvement	3
	Is adequate	2
	Is strong	1
Check whether the measure is being used correctly and controls the risk	Is not working (deficient)	3
	Barely working (marginal)	2
	Working correctly (effective)	1

Check your score and determine where you need additional improvement: whether the design of the measure or the way it is being used or implemented.

There are several methods or ways you can use to control risks. These guidelines will concentrate mainly on the Hierarchy of control which is the MHSa framework for controlling risks at work. The hierarchy of control consists of a specific hierarchy of control methods one or more of which you can use to fix risks at the mine. Section 11 (2) of the MHSa says that the Manager at the mine may, in consultation with the health and safety committee, determine risk control measures by changing the way work is organised, preparing safe systems of work and by using the hierarchy of control.

What the hierarchy of control means and how it works?

Section 11 of the MHSa requires the employer to identify hazards, assess the health and safety risk to which employees may be exposed while they are at work and record the significant hazards identified and risk assessed. The employer must determine how significant risks identified in the risk assessment process must be dealt with, having regard to the requirement of Sections 11 (2) and (3) that, as far as reasonably practicable, attempts should first be made to eliminate the risk, thereafter to control the risk at source, thereafter to minimise the risk and thereafter, insofar as the risk remains, to provide personal protective equipment and to institute a programme to monitor the risk.

When you control hazards, you are trying to reduce the extent to which the people who work for you are exposed to the hazards. The hierarchy of control is a method that requires you to determine and put into practice control measures starting with those that provide the greatest effect. It means choosing the highest measure of control possible when you are selecting a control measure for each of the hazards identified and prioritised. You start from measures that produce the best result, for example, eliminating the hazard to those that are provided as a last resort, for example personal protective clothing and equipment.

In practice, however, you may need to combine different methods to handle a hazard. For example, even though you have installed a local exhaust ventilation system to extract dangerous chemical vapours at source, you are still required to provide respirators, protective overalls and the right gloves to take care of the residual risks (vapours) that remain.

Remember MHSa says you must control risks as far as is reasonably practicable. This means that you should make a judgement of what you think is reasonably practicable when choosing a control measure. MHSa does not give you a specific meaning of 'reasonably practicable' but you can understand it from the general spirit of the law and good practice. Reasonably practicable, as you saw in the first section of the guidelines, means you must consider:

- The seriousness of the hazard and the severity risks associated with it.
- How much people is known, especially in the mining industry, about the hazard and how to control it.
- Whether the means to control the risks are available, for example, the hazard may already be commonly known and handled in your industry and you cannot then claim that you do not know what to do about it.
- Whether the benefit by selecting that control will justify the cost of putting it in place. For example, you need to make a cost-benefit analysis of using a scaffold system for gaining access to broken down giant mobile cranes for maintenance and purchasing an appropriate mobile elevated work platform (MEWP) such as a boom.

When selecting and applying risk controls, you should do so following the hierarchical order of hazard controls as prescribed by Section 11 (2) of the MHSa, which include:

1) Elimination

The best way of controlling a hazard is to remove the hazard from the workplace altogether. Going back to the unguarded mine holes again, the best method to control the hazard would be to remove them altogether. But practically this cannot be done or doing so will entail heavy expenditure. So you need to select the next best action that will reduce the risk of falling into the hole and sustaining injury. You take action to design a fence and cordon off the holes with additional signage as the other best option-an engineering control.

2) Substitution

This is the second best method of reducing risk. Substitution means you should check and consider whether it is possible for you to replace a hazardous chemical, equipment or even method of doing a piece of work with something which is less of a hazard.

3) Isolation

If people can get hurt if they come into contact or interact with the hazard, make sure you try as far as you practically can to stop them from doing so. Try to isolate the employee from the hazards. For example, if an operator can hurt himself by touching the moving wheel of a machine, make sure the machine has a correct guard to deny him access to that part when the machine is in motion. If you operate a chemical store, you can keep away other people who don't work there by leaving it locked except for authorized persons. Using lock out procedures on faulty electrical equipment is another example of isolation to reduce the risk of injury to as low as possible.

4) Engineering controls

If it is not possible to eliminate, substitute or isolate the hazard from the employees, you should try the next set of controls in the hierarchy: apply engineering controls. Engineering controls are changes you make to a work environment or work process to form an additional barrier between the operator and the hazard. They are particularly useful where people are always in touch with the hazard and you need to find solutions to reduce the hazard. For example you can construct stairs with side protective rails as a safer way gaining access than using a ladder; fit a local exhaust ventilation system to extract from source harmful diesel fumes released by your generator; fit damping devices to pneumatic drills to reduce dusts and thus exposure of operators to dust. You may need to make additional modifications to your plant or machinery, e.g. attaching extra guards to reduce to risk of contact with dangerous parts, making operations safer.

5) Administrative controls

Administrative controls are intended to reduce exposure to hazards that cannot be eliminated, substituted, isolated or controlled effectively by engineering a less hazardous solution. Administrative controls enable you to lessen the exposure of your workers by changing the way the job is done or rotating people and assigning them to other job and back to reduce the amount of time that they are exposed to the hazard. To further reduce risks to acceptable levels, you will need to make sure that operators know their work and the operating procedures well. You use administrative measures including providing them sufficient information, instruction and training in the correct procedures and supervising them where necessary. Another good example of an administrative measure is a permit-to-work

you issue to operatives for work at a high risk high voltage generator plant or to enter a confined space.

6) Personal protective clothing and equipment (PPE)

PPE is used as a last resort where you cannot remove or reduce risk by other means. Employees that are exposed wear PPE as the last line of defence if other controls are not sufficient or if PPE must be used together with other controls. For example, when handling chemicals, use safety gloves, glasses, aprons or overalls; protect eyes from flying particles with the right type of goggles and face shields; protect feet using safety shoes and gumboots as required.

You may use PPE as the first line of protection in an interim or short period from a risk that is unacceptably high and which needs immediate action before proper controls can be put in place within a reasonable time; particularly if the control in question is expensive and you need time to locate the money. For example you issue proper respirators to employees to control exposure to harmful chemical vapours in the short-term while a more effective local exhaust ventilation system can be installed to control the risk of inhaling dangerous vapours at source.

You must remember that PPE will only work well as a means of protection if it corresponds with the type and level of the hazard and if they have been selected correctly, fit well, are comfortable and operators are taught how to use, maintain and store them properly.

Monitor and review your HIRA and control measures

Monitoring and review is not a once-off task but an on-going continuous process in which you check on a regular basis your Hazard identification and risk assessments and the controls you have put in place. This helps you to check whether you did not miss significant hazards or whether some that were identified were handled badly and corrections can be made. Remember that circumstances change and need you to regularly check whether your controls are still suitable or valid and are working well. You may need a new risk assessment if you make changes to the work by changing operating procedures, bring in new plant, machines, equipment and tools, employ new workers or younger persons. If you employ new or young workers you will need to conduct a fresh risk assessment and make additional arrangements to train, inform, instruct and supervise them properly to ensure their health and safety.

What you must check and review?

You need to check and take action on:

- The nature of the hazard; for example, you must check whether noise or sound levels at you screening plant have increased (due to wear and tear of the plant), Whether more toxic or concentrated ingredients have been added in the hazardous chemical that is being mixed. In both cases you will need a fresh risk assessment and appropriate controls.
- The likelihood and frequency of exposure: you should regularly check the number of workers that are exposed and how often they are exposed. If the numbers are on the rise, then there is reason for concern and you will need to review your assessments and whether the controls you put in place are suitable.
- The severity of the risk: You will need to monitor high level risks more closely than low level risks.

- Remember that the MHSa requires you to do all the checking and reviewing in consultation with the health and safety committee, health and safety representatives and employees.

The kind of programmes that help you check your controls

There are several ways in which you can regularly check your control measures and take action including:

- Testing and maintenance of controls to make sure those measures are intact and working well. For example, you provide ear plugs to protect operators from suffering from noise-induced hearing loss (NIHL) resulting from prolonged exposure to excessive noise from the screening plant where they work. A way of checking whether this measure is effective is to put in place a medical surveillance programme which will ensure that the hearing capacity of exposed operators is periodically checked to identify early signs of disease. The results over a given period of time will point to you whether your control arrangements are working well or not and whether changes are needed.
- Carrying out inspections to check whether the nature of the hazard or the environment in which it exists has not changed. If there are changes, you will need to conduct a new risk assessment and adjust your controls. For example, if you change the employees carrying out a task, e.g. operators of the drilling rig, you will need a new risk assessment and an adjustment of control measures.
- Consultation with employees, health and safety representatives and committee members allows you good opportunity to inform them of the changes in the nature of the hazards or the work environment. This helps you manage controls better.

Summary of the risk management process

1. Make a plan to identify hazards and assess their risks

- Determine the context and how broad you want the HIRA to go.
- Identify the people who will carry out the HIRA, set up a team
- Gather the important information you need
- Obtain and make sure you understand MHSa and other legislative requirements
- Identify and understand the risk criteria-the acceptable safety standards in your workplace or as applied in the South African mining industry.

2. Identify the hazards

- Identify the things that have a chance to cause injury or harm to the health of people at the mine.

3. Assess the risks

- Understand the nature of the hazard and its risk.
- Identify control measures already in place.
- Determine the chance or likelihood that the risk will happen if a worker is exposed to the hazard.
- Identify the possible consequence if a worker were exposed to the hazard.
- Determine how severe the consequence will be.

- Rank or prioritize the risk by comparing the likelihood and consequence of each hazard (make a list of the risks in the order of ranking from highest to low to show you which ones you should handle as a priority).
- Assess the risks against your risk criteria to determine the kind of action you need to take.

4. Control the risks

- Put in place measures to remove or reduce the risks to a level as low as is reasonably practicable.

5. Monitor and review your assessments and controls

- Monitor and review the entire risk management process.
- Make sure controls are in place, are being used, effective and working well.
- If you make changes to work processes, you must assess the controls again. Conduct a fresh risk assessment, check and see whether the controls will still work well and make the necessary changes.

Remember that the MHSa requires you to consult and communicate with your employees, health and safety representatives or Committee members at all stages of the risk management process.

Workplace inspections and reporting of hazards

1. The meaning of workplace inspection

A workplace inspection is an orderly method used to search and find health and safety problems in the workplace assess their risks and fix them before accidents happen and a person or people get hurt. As an employer and owner of a mine, you should have an inspection procedure which together with your hazard identification and risk assessment procedure help you keep the workplace environment healthy and safe thereby making sure that you meet the requirements of health and safety legislations including the MHSa and Regulations.

2. How do workplace inspections help you?

Workplace inspections help you meet several objectives of your health and safety programme. In particular, inspections are important in helping you to:

- Identify potential problems in the workplace. For example by carrying out an inspection you can find out that certain standards were not observed in the design and manufacture of some items such as PPE and you can also notice hazards that were overlooked during the HIRA exercise or previous inspection.
- Identify defects in some equipment which could make them to malfunction and injure the operator. During an inspection, managers and supervisors have an opportunity to identify worn-out equipment including those that are not being put in their correct use and fix or replace them before they cause injury or breakdown.
- Provide opportunity for managers to check the materials that are being used and the production process. For example, the original materials that were designed for the process may have been changed due to scarcity or high cost, or new methods of production were introduced. An inspection will provide an opportunity to identify hazards that may have been introduced with the changes and deal with them.

- Provide opportunity for you to discover some actions taken to fix a problem following a previous inspection were not correctly done. Incorrect action to fix a problem can cause other even more serious problems while the initial problem is still not fixed. Inspections help you to check whether actions to fix or reduce risks are being carried out correctly and are working.
- Provide an opportunity to check or assess how well you are doing overall in health and safety at work, whether things are in order. For example whether your equipment are in good order or are mostly worn out and only waiting to breakdown; Whether items like tools and materials workers need to do their job are readily available for use or they are scattered everywhere and need to be looked for when needed. Inspections help you identify these weaknesses and put the workplace in order.
- Provide an opportunity for senior managers to show that they care about the health and safety and wellbeing of their workers by being personally involved in checking workplace conditions through safety tours and informal inspections at regular intervals to make sure that workers have the things they need to do their job safely and are working in a safe manner.

Types of health and safety inspections

Workplace inspections can be informal, carried out at given moment at work without having planned it or planned and scheduled to be conducted in a systematic or orderly manner.

1) Informal inspections

Workers sometimes become aware of certain problems when carry out their normal daily duty. In this way they are able to spot problems or hazards as they work, particularly if some changes were recently made. Informal inspections do identify problems but they are not effective because they are not done in an orderly manner and are most likely to miss the important things that need greater effort to find. However, this is a useful form of inspection and you should prepare a procedure to help workers report hazards and health and safety concerns which you should look into and fix and remembering to give them feedback.

2) Planned Inspections

Planned inspections are systematic or orderly assessments of the workplace and the form of a planned inspection will depend on its purpose. You should carry out the following types of planned inspections at the mine, making sure you put in place a procedure for them:

3) Inspections to check equipment before use or after use

These are daily on-going inspections or examinations of tools, equipment, machinery and PPE by workers, operators and supervisors before they are used and after they are used to detect problems and fix them to prevent malfunction or breakdown that can cause an accident resulting in injury to the operator and other workers. For example, Regulation 8.4 (2) of the MSHA requires you to make sure a competent person with the right qualification and experience examines your scraper winch before operation. This is also a type of critical parts or item inspection and also applies to vehicles, equipment such as cranes which have control systems, lights, brakes, etc that can fail or get damaged before their normal scheduled maintenance. Make sure you check this type of machines or equipment before use, normally at the start of the work shift and may need to be checked at the end of the shift. The operator, whose training included this type of inspection, should inspect the equipment, complete the pre-use form, and have it checked by the supervisor who confirms the equipment fit for use.

4) Planned preventive maintenance inspections

Regular preventive maintenance inspections help you determine your priorities for servicing, adjusting, repairing and replacing parts or equipment. You can find out problems and prevent your machines or equipment from failing and potentially causing accidents. Do not wait for your drilling rig to grind to a halt. Have a schedule to maintain it regularly without waiting until it develops a problem.

5) Inspection of critical parts and materials

You should carry out regular inspections specifically on critical parts. Machinery, equipment, materials and some structures at the mine have parts which if damaged, worn or used wrongly can cause major accident or loss. These are critical parts and they remain critical even when removed from the machine or equipment since they need special care. A good example is the grinding wheel which is a critical part while on an angle grinder. When removed, it still remains a critical part because you need to handle it with care and store it in a special way to prevent damage. A damaged wheel used on a grinder can break while in operation and cause serious injury. Hence you should have a procedure for inspecting critical components.

Start by identifying and making an inventory of critical parts in machines, equipment, materials and substances that you are using in the mine. You can obtain the information by examining incident reports and maintenance records; looking at the manufacturer's manual and servicing instructions; consulting your supervisors who should know; interviewing employees especially those who are experienced in maintaining the equipment. Make sure you note down parts that may cause an unsafe situation as a result of impact, heat, vibration, and wear out, corrosion, chemical reaction, misuse and stress.

6) General inspections of the workplace

If you want to go through the whole workplace looking for any hazard, unsafe conditions and practices of employees, then you can plan and conduct a general inspection of the workplace. A general workplace inspection is a complete examination of the workplace that can draw your attention to good health and safety practices of your workers and help you identify problems before they cause accidents. You can schedule them monthly or after every three months but they should be more frequent if high risks are involved or the workplace is experiencing rapid changes for example:

- When you change people by recruiting a batch of new staff or contractors who bring their own workers.
- When you buy and install new equipment or materials such as chemicals.
- When environmental conditions change, for example torrential rainfall with threats of water flooding the mine and damaging surface areas which become hazardous for people and equipment movement. Such changes create unexpected situations such as machines skidding or overturning.

When planning a general inspection, you must prepare a checklist of items you want to check or simple questions which you can complete during the inspection so that your inspection is orderly, thorough and consumes less time. Regular inspections are recommended so that you can keep pace with changes at work but you should make sure you allow sufficient time between inspections so that the actions to fix the problems you identified can be completed.

7) Housekeeping inspections

Housekeeping inspections can help you prevent several accidents. They are done regularly by workers, maintenance staff and supervisors and mainly concentrate on checking the cleanliness, tidiness and orderliness of the work area. The inspector checks overcrowded work areas, obstacles and items on floors, walkways, window seals and glazing, storage, whether lights are cleaned, etc.

8) Senior management inspections

This type of inspections is not large. The General Manager occasionally goes to a work area to check specific issues, for example to check whether employees are using PPE issued to them. Such visits help to emphasize the importance of good health and safety practices and to keep senior management closer to health and safety issues in the workplace.

9) Health and safety committee inspections

As good practice, your health and safety committee will normally conduct an inspection of the workplace before each regular meeting. Such inspections are meant to add to those conducted by managers and supervisors and concentrate mainly on the physical conditions of the workplace: lighting, ventilation, temperatures, etc. Committee inspections can be planned to check special problems. They help supervisors and workers find defects in their work practices which they have become used to and tolerate. These inspections can also be a way of checking whether your entire inspection programme is working well. Always remember that MHSa requires the mine owner or employer to address a problem or concern brought to their attention by the committee failing which the Manager must write to the committee giving reasons for not fixing the problem or addressing the concern. A committee inspection report to management is one of the issues that must be addressed.

Who should carry out inspections: your inspection procedure?

The responsibility for carrying out each type of inspection should normally be assigned to the persons who know it and can do so practically. You should prepare an inspection procedure that will sort this out and also help you plan and carry out proper inspections at the mine. Remember to consult your health and safety committee or health and safety representatives when developing your inspection procedure as required by MHSa. The inspection procedure should clearly show:

- The scope of the inspections (general, covering specific work area, critical parts of machinery, etc.).
- How often the inspections will take place?
- How the inspections are to be conducted including the tools such as checklists?
- Who will conduct the inspections and how they will be trained for the job?
- Who is responsible for making sure that recommendations suggested in the inspection report are acted upon?
- What checks must be carried out to make sure that the action plan has been completed?
- How the inspection should be written and the record kept?

When should inspections be carried out?

It is good practice for you to carry out inspections at your mine early enough so you can find problems and fix them before they cause accidents. How often you carry out inspections will depend on the type of inspection and what you have indicated in your inspection schedule. For example, pre-use inspections are more frequent and done daily or before a shift than planned general inspections which can be monthly, quarterly or once a year. Hence depending on the type of inspection your frequency can be to:

- An inspection before use (pre-use).
- Inspection when equipment is issued, e.g. PPE.
- Inspection when machinery or equipment is serviced, e.g. mobile plant such as trucks, drilling rigs.
- Daily (once per shift, e.g. mobile plant).
- Weekly, monthly, quarterly, annually, e.g. planned general inspections.

It is good practice to develop an inspection schedule showing which area to be inspected, for example, the quarry, crusher plant, contractor, etc; the number of times e.g. daily, monthly, etc; the name of the person to conduct the inspection and indication of the materials to be used in the inspection.

What can help you decide how often to carry out inspections?

- Check the manufacturer's recommendations, which you can find in the manual that comes with the equipment or material.
- Check MHSA Regulatory requirements and practice standards in the South African mining industry, for example Regulation 8.4 (2) regarding examination of Scraper winch by competent person before operation; Regulation 8.6 (4) relating to internal and external examination of booster vent fans by competent person at intervals not exceeding 3 months or at any lesser intervals.
- Check your accident investigation and first aid reports.
- Check the nature of your hazards.
- Check hazardous work processes and areas, e.g. shot firing, drilling areas.
- Check work procedures (some require pre-use examination and other inspections).

How to conduct an inspection? The important things to do in an inspection

You should have a checklist on which you enter all hazards found during each inspection of the workplace. During an inspection you must pay full attention, making sure you look at all items. To carry out a workplace inspection, you will need to undertake the following actions:

- If your checklist requires you to inspect a plant or equipment, look for hazards, defects or missing components or parts such as guards, fasteners, etc. For example if you are inspecting a trackless mobile machinery,, make sure you use the checklist provided by DME and follow the guidelines to check the brakes, emergency brake, lights, operator protection system and the general safety condition of the plant.
- Record the condition of the plant and equipment, also noting the things you checked and found to be satisfactory.
- For each hazard you find, state its location and describe the problem in very simple language using correct names and markings. It is a good idea to take photos and use them as illustrations of what you found.

- If you find other machines that are not being used, ask the operators to start them up if possible because machines that are not being used are usually those that cause the most problems.
- Record any other hazard you noticed in the area, e.g. floor damage, trailing cables, dust pile.
- If you find a hazard that presents a high risk, take immediate action even if the action is a temporary one before a more permanent solution can be found.
- If a hazard or danger you have found is out of control, ask the supervisor in charge to shut down operations and isolate the plant or equipment.
- Make sure you rank your hazards by indicating their risk rating using the risk criteria or matrix explained in the previous section and which you should have included in your hazard identification and risk assessment procedure. The ranking will help the manager recognise the most important hazards that need to be addressed and give them a priority when preparing his budget. High and medium risks should be put on the company's action plan as they will need prompt action.
- Make a comment on the action taken, whether short-term, interim or long-term.
- In summary, your completed inspection checklist should show:
 - 1) The problem areas
 - 2) The actions needed to handle each problem according to priority rating
 - 3) The timetable for carrying out the action
 - 4) The person responsible for carrying out the action
 - 5) When implementation will be reviewed.
- Prepare and document the full report for every inspection. This will tell everyone about the hazards in the workplace and help workers understand the equipment and materials they use. It can help management identify equipment and changes needed in the workplace and also the kind of training needed to improve safety. If you share a report about one area, people working in another area can identify similar problems and fix them. Once a report has been made, make sure that actions are completed before the next scheduled inspection and report. Each inspection report should help to instigate follow-up action between inspections.

Remember, it is important to keep a record of each inspection. The MHSa may require you to keep records for a long time, for example the record of examination of booster vent fans at the mine including remedial actions taken must be kept for at least 10 years (MHSa Regulation 8.6 (5)).

Hazard reporting

Hazard reporting is not part of an inspection but involves reporting hazards that workers find during their normal work. You should have a procedure for reporting hazards that sets out what an employee should do if he or she notices a hazard or an unsafe condition, who to report to or if the person needs to complete a form, what form to take; what further action should be taken if any. The procedure should also show how feedback on the action that has been taken to remove or reduce the risk from the hazard will be given to workers who report a hazard. Remember that MHSa requires you to address health and safety concerns employees report to you failing which you must provide them written explanation why you cannot take the necessary action.

6.5 Guidelines for the health and safety of the work environment

Small-scale mining, quarrying and extractive operators carry out various kinds of operations including exploration, disturbance, removal, washing, sifting, crushing, leaching, roasting, evaporation, smelting and refining, pelletising. These operations may relate to any structure of rock, stone, fluid or mineral. This means that workers are exposed to a wide range of

hazards including mineral dusts, diesel fumes, and different kinds of harmful chemicals used in mineral processing and in maintaining and repairing mine plant and equipment.

These types of operations are work environment activities and generate hazards commonly known as physical, chemical and biological hazards such as dust, fumes, gases, noise, heat/cold, vibration, radiation and bacteria. The most significantly rated work environment hazards in surface and underground small-scale mines are dusts, noise, ergonomic hazards, diesel fumes and gases and UV radiation, polluting portable water, bacteria. Other hazards include: heat and vibration.

They are hazards to health and their Levels in the work environment can be checked (monitored) using occupational hygiene measurements to determine whether they exceed occupational exposure limits stated in various DME guidelines and therefore present health risks to workers exposed to them. If there is a significant risk to employees of any one of these hazards, e.g. noise, the employer must assess and control exposure, establish a programme to monitor workplace and personal exposure and provide health surveillance of exposed employees.

What the MHSa says?

Section 11 of the MHSa stipulates that, as the owner of a mine or the employer, you must identify hazards and assess their risks to the health and safety of people working for you who are exposed to the hazards. You must make a written record of the important hazards and risks and show what you are going to do about them. Section 12 of the MHSa requires you to hire an occupational hygiene expert to measure levels of exposure to hazards at the mine if you are required to do so by regulation or notice in the Gazette or if your initial hazard identification and risk assessment identified health hazards that require occupational hygiene measurements and medical surveillance.

Your initial hazard identification and risk assessment (HIRA) should be used as the starting point to check whether your site has any work environment hazard. For example, if noise is found to be a problem, there will be a need to conduct a noise-specific risk assessment. If the assessment finds no significant risk, then you must report to the Inspector of Mines, keep and maintain current controls and continue monitoring levels to ensure they remain low. If however your assessment indicates a significant risk then you must develop a Code of Practice for Noise, control the noise, establish and maintain a system of occupational hygiene monitoring and a system of medical surveillance to protect workers.

If you have identified these hazards at your mine, you must assess the risks and manage them in terms of Sections 12 and 13 of the MHSa:

- 1) Identify the hazards.
- 2) Assess the risks, do occupational hygiene measurement and personal exposure monitoring.
- 3) Control the risks using hierarchy of controls.
- 4) Monitor controls and review.
- 5) Medical surveillance.

NB: These guidelines will examine some of the work environment hazards that MHSC studies have shown to be problematic in small-scale mining. These include dust, noise, vibration, radiation, thermal stress (heat/cold) and hazardous substances (chemicals).

1) AIRBORNE DUST

Importance of the size of dust particle

The size of dust particle is important in determining its ability to harm the person exposed to it.

a) Inhalable dust

Inhalable dust consists of dust particles greater than 5 microns up to 10 microns. The body has a defence mechanism against larger particles of dust which are caught in the mucus membrane of the nose, sinuses, trachea and bronchi and moved up with mucus to the throat and is either spat out or swallowed.

b) Respirable dust

The particles are less than 5 microns (0.005mm) in size and are not visible to the naked eye. They are called respirable because when inhaled, they penetrate deep into the oxygen exchange area of the lungs (where oxygen enters the bloodstream). The dust will attach itself to the lung tissues and may eventually cause fibrosis of the lungs. The age of the person when first exposed to the dust, the concentration of the dust and the number of years the person is exposed including personal characteristics such as being asthmatic will determine the degree of fibrosis produced and long term health effect.

Examples of dusts common in surface and underground mines that is harmful to the respiratory system includes: silica (quartz, chert), silicates (asbestos, tale, mira and sillimanite) and metal forms.

Other types of harmful dusts

a) Toxic dust

These dusts can poison body tissue and organs and the nervous system. Examples are: mineral ores containing arsenic, lead, mercury, tungsten, nickel and silver.

b) Explosive dusts

Dusts mix with oxygen when airborne and if the right mixture is reached and there is an ignition source, there will be an explosion capable of causing other secondary explosions of contained flammable materials such as LPG. Examples are metallic dusts such as magnesium, aluminium, zinc, tin and iron.

Sources of airborne dust at mines

Airborne dust in mining is created by several things including:

- Natural wind action blow up dust.
- Earth moving equipment such as bulldozers.
- Vehicles and moving or mobile equipment such as forklifts.
- Drilling operations.
- Blasting rock using explosives (shot firing).
- Loading dumper trucks and dumping.
- Feeding, crushing and screening of ore.
- Conveyors.
- Dust generated at transfer and discharge points.

- Bins and stockpiles.
- Mine road transport (roads are dust paths often not paved).

Factors to consider when undertaking a suitable stone dust risk assessment:

A suitable and sufficient risk assessment for stone dust should consider:

- The routes of entry of the dust e.g. by inhalation, skin contact and ingestion. The particle size of the dust will determine how far into the body the dust will pass e.g. if it is respirable i.e. between 0.5µm – 5µm it will penetrate the air exchange region of the lungs and is more dangerous.
- The health effects of the dust e.g. it may irritate the eyes and skin and respiratory tract. Depending on the physical and chemical properties e.g. from crystalline rock, can cause long-term health effects such as silicosis.
- The number of workers exposed the level, frequency and duration of exposure/has a bearing on the total level of exposure and dose.
- Are there vulnerable or susceptible individuals e.g. with asthma?
- The work methods used (hand tools or power tools).
- The results from the monitoring of airborne contaminants and comparison with the WEL.
- The results of health surveillance.

Who are most exposed to airborne dust?

Exposure to airborne dust at mines depends on where people work. Work areas where people are most exposed include:

- People doing extraction: Drill and rig operators, quarry operators, drivers of earth-moving equipment (loaders, bulldozers), scraper operator and drivers.
- People involved in transport such as truck and grader drivers.
- People working in the treatment process involving the crusher and screening plant, for example the crusher operator including the attendant, the screen house attendant, feeder attendant and general hand conveyor attendant.
- People carrying out servicing, maintenance and supervision work: persons managing shifts, electricians, forklift operators, ventilator, supervisors, weighbridge attendants, cleaners and other office staff.
- The nearby local communities may also be exposed to airborne dust from the mine. Dust produced by blasting in open mines and quarries may not only pollute neighbouring areas to the mines, the dust will also settle on their rooftops some of which is blown into community atmosphere by winds.

Health effects of exposure to airborne dust at the mine

The effects of airborne dust on the health of workers exposed to them depend on the physical and chemical properties of the dust and are short-term (acute) and long-term (chronic). Short-term health effects from exposure to most of the dusts include irritation of the eyes, skin and the respiratory tract.

The more long-term health effects include silicosis resulting from prolonged exposure to silica from crystalline rock in quarries and hard rock mining; asbestosis from exposure to silicates including asbestos, talc, mica and silimanite; pneumoconiosis or coal miner lung disease from exposure to coal dust. These diseases take several years to manifest and medical monitoring of personal exposure will help detect early onset and prevent development of disease.

Studies conducted by MHSC showed that dust is one of the most significant health hazards in surface and underground small scale mines, particularly hard rock dusts containing crystalline silica. If mine workers breathe in these dusts for a long period they can develop silicosis or lung damage. Silicosis can also lead to heart failure and increase the risk of contracting other lung diseases such as tuberculosis. Even when a mineworker who was exposed to silica dust has retired, silicosis can still progress.

Some mineral ore dust such as arsenic, lead, mercury, tungsten, nickel and silver are toxic and poisonous to body organs and tissues when exposed to them at concentrations above the acceptable occupational exposure limit.

HOW TO CONTROL AIRBORNE DUST IN MINES?

a) Comply with MHSA requirements

If your HIRA finds that dust presents a significant risk to workers exposed to air at the mines, then you should make sure that you develop a CoP for Airborne pollutants and put in place an occupational health programme to control exposure to harmful airborne dust. Dust is harmful if it reaches the particulates level $\geq 1/10$ of the occupational exposure limit. To comply with sections 11, 12 and 13 of MHSA and regulation 9.2(2), you must do the following:

- You must develop and put into practice a code of practice for an occupational health programme to control airborne dust and other significant risk pollutants such as diesel fumes and gases (Section 9(2) of the MHSA using the guidelines developed by DME.
- You must assess risk by measuring concentrations in the work areas and personal exposure of people working in the affected areas.
- You must control exposure and contamination using the hierarchy of control.
- Put in a place a system of medical surveillance of personal exposure. This helps you carry out and establish initial baseline medical examination of new recruits, conduct a periodical medical exams and exit medical examinations to check changes in their health following exposure. This will tell you whether your controls are sufficient and working properly or more need to be done.
- Provide information to and train employees in the use of controls and procedures and make sure you supervise them.
- Put in place monitoring programmes to check airborne pollutant, e.g. dust levels, test and inspect workplace controls taking into consideration results obtained from medical surveillance.
- Review your controls.
- Keep records of risk assessments, personal and workplace monitoring and medical surveillance.
- Send your report on personal exposure monitoring and annual medical surveillance reports to your local principal inspector of mines to comply with Regulation 9.2(7).

b) Controlling airborne dust

If the initial hazard identification and risk assessment revealed that dust is a hazard at your mine, your first step in controlling dust at the mines is to conduct a dust risk assessment put in place a programme in which you consistently measure dust concentrations for all activities that generate dust at the mines. This helps you to control dust generation and reduce the exposure to dust of people who work for you. There are methods that are generally used to

control dust but in selecting them you must use the hierarchy of control to meet the requirements of Section 11 (2) of the MHSa.

c) Measures to remove dust

You can control dust by removing it using the following innovative methods.

- Using a system of wet drilling which stops dust emission at source.
- Using a system of water mist drilling which sprays water to attenuate the dust.

d) Control methods to reduce dust exposures include:

Engineering controls (at source)

- Using drills fitted with an exhaust system which removes and collects the dust as work progresses.
- Using a proper ventilation to dilute dust concentrations by supplying pure air with no dust to the work area for example to the face where people are drilling and to dead ends of the work area where dust have nowhere to go.
- Dusty machines and transfer points can be enclosed to separate operators from dust, for example providing dust proof cabins on drilling rig with adequate ventilation and cooling (air conditioning).
- The operator's room can be put under positive air pressure to make it free of dust and difficult for dust to enter the room from openings.
- Use clean dust free water to spray on dusty surfaces on surface and underground mines.

Administrative controls

- Make sure you carry out good housekeeping by cleaning up any spillage of ore or materials, paving the plant area e.g. crusher or screening and keeping the area damp to prevent dust accumulation.
- Make sure that all vehicles apply a reduced speed limit near the plant so that they raise less dust.
- If you create dump piles, spray them with chemicals to coat them and prevent wind-generated dust and allow grass and trees to grow on them.
- You can manage mine roads in ways that reduce dust generation.
- Pave mine surface as far as you practically can.
- If you cannot provide paving, make sure that you water the roads and tracks as often as practicable, particularly before trucks leave the loading site.
- Restrict traffic movement so that specific vehicles use specific roads or tracks, for example, specify roads used by dumper trucks.
- Install speed limits for vehicles and make sure that these are observed.

Personal protective equipment

- The provision and use of personal protective equipment including RPE, eye protection, gloves, hearing protection and overalls. The RPE should fit the face properly, should be comfortable to wear for prolonged period, be compatible with other PPE e.g. goggles, the RPE should be subject to face fit testing, be cleaned regularly and stored properly with workers properly trained in their use, storage and maintenance and reporting of defects.

Welfare and personal hygiene

- Enforcing proper personal hygiene and provision of adequate and appropriate eating facilities.

Provision of information, training and supervision

- Provide employees information on the health risks of dusts to which they may be exposed and train them to apply the controls in place to prevent or reduce exposure and supervise to ensure controls are used properly.

Environmental and personal exposure monitoring

- Monitoring of airborne concentration in the work areas as well as personal sampling and health surveillance to ensure OEL is not exceeded.

Medical surveillance

Carry out lung function or spirometric tests to monitor personal exposure of employees and identify early signs of disease and provide treatment. Medical surveillance also helps to check whether the control measures are working properly.

Review and reporting

Carry out regular review of controls including the environmental and personal monitoring programme and the medical surveillance programme using results of monitoring and introduce improvements. Make sure that the annual medical surveillance report is compiled and sent to the Inspector of mines.

DIESEL PARTICULATE MATTER (DPM)

Some mining companies use diesel-powered plants in mining operations underground which emit toxic and irritating exhaust gases into the underground work areas which may also be confined spaces. Workers may therefore be exposed to these emissions. Diesel emission contains a mixture of gases, vapours and particulates including carbon monoxide, carbon dioxide, nitrous oxides, polycyclic aromatic hydrocarbons (PAHS), nitric oxide, nitrogen dioxide, hydrogen sulphide and sulphur dioxide.

Control methods include:

- Remove the fumes using mechanical exhaust ventilation systems the exhaust ventilation extracts air from inside the mine and creates a flow of clean, outside air being drawn along shafts.
- Auxiliary ventilation can supplement natural and mechanical ventilation systems inside the mine.
- Auxiliary ventilation can be used when main air currents are small and are not reaching all work areas; to supply dead ends, blind corners or sites where air is not replenished by currents from the main ventilation system; to supply clean air to areas of a site where air is contaminated and cool air to hot working places.

NOISE

Noise means any sound that could adversely affect the health of any person exposed to it. There is an occupational exposure limit for noise and DME code of practice says a

significant noise hazard is a noise of $\geq 82 \text{dBL}_{\text{Aeg}}$.8h. Surveys conducted by the **MHSC** show that noise is a big health problem for employees of small surface and underground South African mines. Excessive noise levels are produced by the type of plants, machines and equipments you use including drilling rigs, pneumatic drills, chipping hammers, angle grinders etc.

Prolonged exposure of workers to excessive noise levels can in the long term cause them hearing loss called Noise-Induced hearing loss (**NIHL**) and this is a permanent disability that is costly to the worker in terms of lost earnings and the family (Loss of cure) and the employer in compensation claims and training of new workers.

Where your HIRA in terms of **Section 11 of the MHSA** reveals that noise is a problem at your mine, you must meet the requirements of Sections 12 and 13 of the **MHSA** through the following activities:

- Compile a mandatory code of practice for an occupational health programme for noise at the mine (the **DME** has produced guidelines on how to develop a cop on noise).
- Conduct a noise risk assessment and put in place control measures
- Put in place and maintain a system of measuring the exposure of your employees to noise (Regulation **9.2(R)** of the MHSA to ensure noise is maintained below the regulated limit.
- Put in place and maintain a system of medical surveillance in which you check employees at specific intervals for **NIHL (R.11.4 of the MHSA)** for noise level $\geq 82 \text{dBL}_{\text{Aeg}}$.8h.
- Report and review monitoring and medical surveillance of exposed employees.

Carrying out a noise-specific risk assessment

The noise risk assessment should be carried out by a qualified occupational hygienist to comply with the MHSA sections 11 (1) (a)-(c) and 12 (2) (b).

The risk assessment process quantifies the levels of noise for all noisy work situations, to enable you determine noise reduction requirements and identify the range of hearing protection devices needed. Risk based medical examinations of employees are then performed before you issue them hearing protection devices such as earplugs.

If the level of risk is significant:

- 1) Implement or revise Hearing Conservation Programme (HCP) under the authority of health and safety committee (MHSA 11 (2) (a)-(d) involving health and safety representatives (MHSA 1 section 1 (7) (a) and participation by employees (MHSA section 11 (7) (b)).
- 2) Implement noise control using the hierarchy of control (descending order of preference).
 - a) At source control (Engineering controls)
 - b) Administrative controls
 - c) Personal protection
- 3) Provide education and training in hazard awareness and risk control measures (MHSA sections 10 (1) – (3)).
- 4) To ensure personal protection.
 - Provide risk based medical examinations e.g. audiometry tests (MHSA section 13 (2) (c). Occupational health personnel will recommend types of hearing protection devices (HPDs) (MHSA 13 (5) (a) (b)).

- Instruct employees in the use of HPDs during training MSHA sections 10 (11)-(13).
 - Issue PPE and make sure employee compliance is monitored.
- 5) Evaluate all control measures through medical surveillance.
(MSHA sections 12 (1)-(3) through:
- Audiometry
 - Re-assessment of risk and occupational hygiene measurements
 - Personal exposure
 - Work area exposure
- 6) Use all findings as inputs to review and improve HCP.

Risk based medical examinations

This is an element of the medical surveillance system and is done as part of the risk assessment. Its aim is to determine personal susceptibility or conditions of employees or new recruits to work in noisy areas. This examination helps to address health concerns, for example to check whether the employee has an abnormality that makes him/her susceptible to hearing loss, and safety concerns, for example to check whether the employee will be able to hear warning signs when wearing ear plugs or other hearing protection devices. This procedure is repeated whenever conditions in the workplace changes, for example, noise levels in the workplace are shown by occupational hygiene measurements to have changed.

Health effects of noise exposures

The acute and chronic physiological effects of exposure to high noise levels would include:

- Threshold shift, which can be temporary and would be reversed if exposure is stopped.
- Permanent threshold shift: This is due to repeated chronic exposure to high noise levels and the damage cannot be reversed.
- Tinnitus: ringing in the ear that can be acute but would resolve when exposure is discontinued and may become a chronic condition exposure continues for a longer period.
- Noise-induced-hearing loss where the worker suffers loss of sensitivity to sounds in the speech range. This condition can occasionally be immediate when the person is exposed to an extremely loud impact noise as from an explosion, but usually appears as a chronic condition after a long period of exposure to high levels of noise.

How to control noise levels at the mines?

The MSHA requires you to control hazards using the hierarchy of control but remember that this is a health hazard, the exposure to which can be measured and therefore have additional requirements to achieve protection. The DME guidelines show you how to apply the hierarchy of control, which is required by MSHA to control noise. Specifically through:

(i) Elimination

- Substitution e.g. substitute a noisy equipment for less noisy ones
- Innovation

(ii) Engineering controls involving

Using engineering measures when it is not reasonably practicable to remove the noise source altogether. You can:

- Totally or partially enclose the noise source to separate employees from exposure for example by installing acoustic covers or barriers on a noisy equipment.
- Install silencers to noise emission exhaust systems to reduce noise levels.

(iii) Administrative controls

If engineering controls do not reduce noise to acceptable levels:

- Segregate hazardous noise areas by demarcating them as prohibited noise zones accessible only to authorised persons wearing required protection.
- Introduce safe systems of work.
- Reduce exposure time by rotating workers to other tasks or giving them more or longer short breaks.

(iv) Single method

If a single method does not give a satisfactory result, you will need to use a combination of controls e.g. demarcating noise zones plus use of hearing protection such as earplugs.

(v) Personal protective devices

- Provide appropriate hearing protection devices such as ear plugs, muffs, which conforms to **SABS** standards.
- Provide information, instruction and training to employees on how to wear, maintain and store them properly and obtain new ones when required.
- Supervise employees to make sure that they are on their protection and doing so correctly.
- Educate workers about the health effects of exposure to excessively high noise levels.

(vi) Procedures for noise control

It is good practice to prepare procedures for noise control and make sure everyone knows about them and uses them correctly.

Medical surveillance of noise exposures

Objectives

- To monitor employees personal exposure e.g. employees hearing.
- To evaluate the effectiveness of the whole programme to control exposure (e.g. the incidence of NIHL).
- Medical surveillance is the responsibility of occupational health and occupational medical practitioners.

Review of the hearing conservation programme (HCP)

The following aspects of the HCP must be reviewed at regular intervals:

- The noise measurements for risk assessment: the occupational hygienist measures noise emissions in noise zones and employees exposure levels using personal monitoring devices. This is done every 2 years according to SABS 083: 2000 standard or immediately where changes are made to equipment or area where it is installed.
- Education, motivation and training. You should monitor this aspect on an on-going basis, quarterly or as often as the need arises following an assessment.
- Source transmission and control monitoring by occupational hygienist must involve the engineering department to check machinery so that targets are maintained.
- Administrative controls, the results of personal exposure measurement (dosimetry) and medical examinations (audiometric) test will show whether the administrative controls are working properly. It is good practice to review these measures every 3 to 6 months or annually for audiometric tests.
- Personal protection.
- Risk based medical examinations.
- Medical surveillance and audiometry. Review audiometric tests for high risk employees every 6 months and others annually.

Annual reports

Section 16 of the MHS Act states that the occupational medical practitioner must compile an annual medical surveillance report and submit to the local inspectorate of mines.

Reports on the overall review of the HCP should be compiled annually. The review should identify areas for improvement including an action plan and the criteria for assessing progress before the next review.

VIBRATION

Whole-body vibration (WBV)

Operators and passengers of heavy trucks, tractors, graders, loaders including drivers of light motor vehicles are exposed to whole-body vibration due to poorly suspended vehicle cabins and seats. Whole-body vibration means the body being shaken vigorously up-down, from one side to the other and backward-forward or vice versa.

Factors that affect exposure to vibration include:

- Vibration of the vehicle due to the design or wear and tear.
- The seating and suspension of the vehicle.
- The condition of the road surface (bumps and potholes, rises and slopes).
- The speed of the vehicle on the road.

Operators and persons sitting in drilling cabins of tractors, trucks, earth-moving and drilling equipments are exposed to whole-body vibration. The worker is shaken up and down, side by side or back and forth. A worker standing near vibrating plants or machinery will also experience whole-body vibration.

Health effects of whole-body vibration

Low frequency vibration of just **1Hz** can cause drivers to have motion sickness and vibration between 1 – 80HZ can lead to nausea, blurred vision and giddiness. Vibration affects the lumbar spine. Exposed workers suffer from low back pain and neck pain.

The more chronic effects on health include damage to the bones and joints including the backbone due to prolonged rubbing that causes inflammation. Stomach and digestive problems from persistent shaking of organs and the abdomen, heart problems, varicose veins and pile because of constantly changing blood pressure; disruption of the nervous system causing weakness, fatigue, loss of appetite, headache, sleeplessness or insomnia and impotence.

How much damage vibration can cause to an operator or worker depends on the amount of time that he/she is exposed, the rate at which the surface or equipment vibrates and the displacement of the equipment. These aspects of vibration are important in looking for ways to reduce it.

Controlling WBV

Control measures that could be used to minimise the risk to bulldozer drivers from exposure to whole body vibration would include:

- Selection of vehicles best suited for the terrain and task (size, power capacity).
- Ensuring that an individual's exposure to WBV is kept below the recommended threshold.
- Ensuring that traffic route surfaces used by the vehicles are smooth and even as far as reasonably practicable.
- Maintaining the vehicle's suspension.
- Fitting suspension seats with vibration damping mounts.
- Adjusting seats to suit the weight of individual drivers to avoid seat collapse.
- Reorganising work patterns to reduce exposure time e.g. more breaks, job rotation.
- Advising drivers to minimise exposure by avoiding jolts, shocks – controlling speed.
- Training and instruction
- Health surveillance and records.

4.4 Hand-arm Vibration (HAV)

Workers operating hand held machinery such as pneumatic, chipping hammers, rivet machines, pneumatic rock drills, chain saws, experience vibration syndrome and vibration white finger.

Factors affecting exposure to hand-arm vibration include:

- The properties of the tools being used, e.g. the size, weight, age of tools and their maintenance history.
- The materials being worked by the operator, for example, hard rock, quartz.
- The work process e.g. cutting, drilling, grinding).
- The technique used by the operator, for example the type and force of grip and orientation of the hand-arm.

Health effects of HAV

Hand-arm vibration is also known as vibration white finger or dead finger and affects workers' health in various ways:

- The more short-term effect on health of HAV is tingling or numbness in the fingers after work and the finger tips turning white as exposure continues.
- The more long-term effect to health is the worker developing whiteness in the whole finger with exposure for a long time.
- The worker may develop gangrenous fingers which has no cure and may need to be cut off or amputated causing disability.
- The worker may develop carpal tunnel syndrome.

In addition, operators who use noisy vibrating tools also suffer from noise-induced hearing loss.

How to control exposure to HAV?

You can use the hierarchy of control to manage exposure to HAV

- 1) You can avoid HAV by doing the job another way but if this is not reasonably practicable.
- 2) Substitute by using a different tool or changing the material being worked, and if still not possible.
- 3) Use engineering measures to interrupt the pathway of vibration by damping or isolation. If this is not effective in reducing vibration to acceptable level.
- 4) Introduce administrative controls including:
 - Safer systems of work such as replacement of worn-out tool parts regularly, selecting the right tool for the task, redesigning tools to avoid the need to grip high vibration parts or reduce grip force.
 - Grant more breaks to reduce exposure time.
- 5) Provide workers with information and training on the safe systems of work and maintenance of tools to limit vibration.
- 6) Provide medical surveillance to comply with MSHA requirement by screening operators and drivers for early signs of health effects and limiting further exposure in those with hand-arm vibration syndrome.

Technical Control measures for HAV include:

- Consider changing the way the job is done so as to eliminate or alleviate the need for hand-held power tools, or consider changing the material on which work is done.
 - If this was not possible, automate the work.
 - Avoiding smaller tools since these prolong the job and exposure time.
 - Replacing the tools with less vibration models.
 - Regular maintenance of equipment to keep vibration to its designed level.
 - Modifying the equipment e.g. grips by damping to reduce transmission of vibration.

Organisational control measures include:

- Ensuring that procurement policy takes into account vibration emission and purchase lower vibration equipments.
- Changing work station designs to minimise loads on hands, arms and wrists e.g. using jig or suspension systems to hold tools.
- Providing gloves and clothing and warm environment to encourage blood circulation.
- Planning work schedule to limit time of exposure to vibration e.g. taking several breaks.
- Safer systems of work such as replacement of worn-out tool parts regularly, selecting the right tool for the task, redesigning tools to avoid the need to grip high vibration parts or reduce grip force.
- Using job rotation to limit exposure time.
- Having health surveillance in place to check exposure and monitor exposed workers to detect early signs of disease and provide treatment.
- Referring those with early symptoms to the occupational health department.
- Ensuring workers are adequately informed and trained on the risk of the work processes, the symptoms of HAVs and the precautions to take.

ERGONOMICS

- Manual handling hazards – Lifting heavy objects and activities requiring exertion of force to lower, push, pull, hold or restrain a person, animal, thing.

Examples include:

- An operator reaching for controls (man-machine interface), awkward postures during drilling activities with pneumatic rock drills, lifting and pushing items on shelves, moving gas cylinders, etc.

Examples of manual handling injuries

- Strains and sprains.
- Neck and back injuries.
- Slips, falls and crush injuries.
- Cuts, bruises and broken bones
- Hernia, strained heart muscles.

Controlling ergonomic hazards

Train employees in

- Safe manual handling methods.
- Specific manual handling hazards.
- Safe work procedures.
- Using manual handling aids e.g. Trolleys, forklift trucks, conveyors.
- The right to ask for help.

Prevention through:

- Education, Training and Supervision

RADIATION

Ultraviolet (UV) radiation from sun, outdoors and welding arc and UV lamp in the work place are hazards in surface mines and quarries.

Health effects of exposure to UV radiation

Over exposure to UV radiation can cause serious short-term (**acute**) and long-term (**Chronic**) health problems to workers.

- 1) Acute effects include inflammation of parts of the eye including the mucous membrane and cornea. More long term effects of prolonged exposure to solar radiation include damage to the cornea, formation of cataracts and pterygia (wing/shaped growths of the tissue outside of the eye).
- 2) Exposure to welding arcs results in the welder developing welders flash or arc-eye which in a painful irritation of the cornea and conjunctiva of the eye. There is a feeling of sand in the eye and sensitivity to light. Always remember that the eye is more sensitive to UV radiation or light because it does not have the horny outer layer and protective pigment like skin.

Measures to controlling UV radiation include:

- Introduce different outdoor work programs and if not possible.
- Rotate tasks when the sun is most intense
- Provide canopies and shade covers to minimise or reduce exposure operators.
- Provide air conditioned cabins on drilling rigs.
- Provide appropriate PPE to minimise exposure making sure the PPE does not create a secondary hazard e.g. loose clothing worn near outdoor machinery such as a post-heel rigger may cause entrapment. Heat stress can result from wearing heavy or thick protective overalls or double suits carrying out heavy manual labour.
- Multiple forms of personal protection are preferred to using single e.g. use a hat and sunscreen rather than just the hat or sunscreen alone.
- For clothing, select cotton fabrics because they are woven tightly to prevent sun radiation from reaching the skin and also allow sweat to evaporate reducing the risk of heat stress.

THERMAL STRESS

Section 11 of the MHSA says that owners of the mine or the employer must identify hazards and assess their risks to the health and safety of people working for you who are exposed to the hazards. You must make a written record of the important hazards and risks and show what you are going to do about them. You should be guided by sections 11(2) and (3) MHSA which states that you should, as far as reasonably practicable, first attempt to remove the risk altogether and if not possible, control it at its source or where it is created, and if not possible try to reduce the risk. If after doing all of these things and the risk still remains, then you must provide PPE and put in place a programme to enable you monitor or check the risk. This means that you should use the hierarchy of control when determining control measures, the best being always to eliminate or do away with the hazard with PPE the least effective measure and only provided as a last result.

The 2012-2013 Mine Health and Safety Inspectorate annual report stated that thermal stress is still a significant risk in South African mines. If your baseline HIRA finds that thermal (heat and cold) stress are a problem at the mine, you must carry out a thermal stress risk

assessment by measuring of exposure and compare the indices to the recommended thermal indices. If the risk is not significant, you must report to the regional principal inspector. If you find that heat and cold are a significant risk at the mine then you must develop a COP for Thermal stress at the mine and put in place an occupational health programme to monitor the work environment and control exposure to heat and cold and the effect of contamination using the hierarchy of control and medical surveillance. You must, provide information, instruction, training and supervision to exposed employees and make sure you test and check your controls regularly to make sure that they are still suitable and working properly.

- 1) Develop a COP for your site.
- 2) Implement heat stress management where risk assessment determines significant risk.
 - Provide a structural organisation for heat stress management consisting of detecting medical and physical factors for working in heat and heat intolerance through screening procedures and how workers progress naturally in heat acclimatization using safe work procedures in place.
 - Conduct medical and physical examinations.
 - Carry out heat tolerance screening to determine overall fitness for work.
 - Use safe work practices in surface, open cast and underground operations.
 - Check and manage absenteeism.
 - Meet water and nutritional requirements during work in heat.
 - Emergency work.

Heat stress monitoring

You should monitor the work environment to determine temperature, humidity and airflow in those areas where heat risk exists. In surface, open cast mines and quarries, ventilation will need to be provided in those areas where people are working and heat has been identified as a significant risk. Such areas include: fixed control rooms, control rooms and cabins of mobile plant and equipment such as drilling rigs, bulldozers; conveyor attendant workstations, confined spaces where ventilation is poor and airflows small or radiant heat is being emitted from machinery e.g. crushers, tunnels, silos; screen houses and all enclosed work areas in radiant heat conditions form high ambient temperatures e.g. offices, rest and eating areas, welfare facilities and change and storage rooms.

For surface operations, you will need to measure ambient temperature but you may also take wet and dry bulb readings and wind speed or air flow depending on the environment of operations. Where operations are underground, the ambient temperature, wet and dry bulb readings as well as wind speed and airflow will need to be taken.

- Conduct monitoring all year round (Regulation 9.2 (7)).
- Collate results representative of all full working shifts for each thermal environment (category of the thermal environment and all employees in that thermal measurement area).

Formal Monitoring Period

- Risk assessment and thermal monitoring conducted during the warmest quarter of the year (Jan-March for underground mines).
- Routine monitoring – all areas of work.
- Adjusted monitoring – if prevailing conditions are close to upper limits e.g. within 1-2°C dry or wet bulbs.

Decision to continue or discontinue monitoring of cold and heat stress is determined by the seasonal changes. For example in autumn heat stress monitoring is discontinued but dry bulbs and air speed are measured to determine equivalent chill factor. Cold stress monitoring must be implemented in winter (June to August) and discontinued in spring but continuing to measure dry-bulb and wet-bulb indices. Heat stress management should be implemented in the summer period.

Health effects of heat exposures

Exposure to excessive heat during work can have very serious effect on employees' health. Exposed persons can suffer from:

- Heat exhaustion with symptoms that include headaches and dizziness, weakness, feeling irritable and confused, vomiting and fainting. Heat exhaustion may lead to heat stroke if treatment is delayed.
- Heat stroke with symptoms including dry pale skin, feeling irritable and confused, seizures, fits, collapse and unconsciousness. The affected worker may die if treatment is delayed and such a case must be handled as an emergency and taken to hospital immediately.

Controlling heat using the hierarchy of control

Hierarchy of Control measures include:

Elimination

- Mechanise tasks to remove manual labour which requires greater physical exertion.
- When purchasing plant and equipment, select those that can be remotely controlled thus separating the operator from the heat source or those with lowest heat emission rating.

Substitution

- Try to replace hot processes with cold ones.
- You can make sure that acclimatised employees replace personnel that are not yet acclimatised.

Engineering controls at source

- Dilute hot area with ventilation.
- Put cooling systems such as air-conditioners in mobile plant cabins.
- Fit radiation (heat) barriers between operators and heat generating plant and equipment.
- Insulate pipe-work and conduits which carry heated products.
- Provide shades for people working outdoor.

Administrative controls

- Self-pacing to prevent fatigue.
- Introduce and enforce safe systems of work in hot conditions.
- Reduce exposure time by allowing longer rest periods.
- Drinking rules for employees and provide drinking facilities with ample fresh cold water.

Protective Equipment

- Provide body cooling garments; sunscreen, glasses and hats for work outdoor.

Health monitoring

- Carry out hydration testing and fitness assessments to make sure workers are fit to work in hot conditions.

COLD STRESS

Land temperatures can go to freezing or below freezing points and water temperatures below 37°C. Working under these conditions exposes the worker to illnesses and injuries related to cold. If cold is a significant risk at your mine you should comply with MSHA requirement to develop a mandatory code of practice for cold stress, put in place a programme of monitoring exposure and carrying out medical surveillance of employees exposed to cold. The formal monitoring period is the cold stress quarter from June to August.

Health effects of cold stress

- Frostbite – freezing of the tissue when skin is exposed to air temperature below zero or when wind speeds are high.
- Frostbite can scar the skin, lead to tissue damage and possible amputation causing permanent disability.
- **Hypothermia**- Deep body or “core” temperature drops below 35°C at which point the body loses its ability to prevent heat loss. Hypothermia can lead to coma and death if not treated quickly.

Controlling prolonged exposure to cold air or immersion in cold water includes:

- If work is performed at temperatures below 40°C, provide workers with dry clothing to maintain deep body temperature below 36°C.
- Reduce the duration of exposure especially among older workers and susceptible workers with circulatory problems. You need a physician with knowledge of cold stress factors to assess the medical and physical condition of the workers.
- Reduce work rate so that workers do not sweat and cause their clothing to get wet and worsen cold.
- Make sure that new employees do not work full time in cold conditions until they have stayed long enough to acclimatise and be able to use PPE needed.
- Balance the weight of clothing and the work employees are supposed to do especially if they have to lift heavy loads.
- Modify work procedures so that workers do not sit still or stand still for prolonged periods. Put cushions on metal seats.
- Provide your employees sufficient information and training about the procedures and controls you have put in place to protect them from excess cold. If necessary supervise them to ensure they are complying.

A successful training programme should include:

- Proper procedures for workers to warm themselves up again and how to apply the correct first aid treatment.
- Proper clothing practice, for example provides special wind protective clothing depending on the wind speed.

- Proper eating and drinking habits, for example drinking hot tea to keep warm.
- How to recognise the signs of frostbite.
- How to recognise the signs and symptoms of hypothermia or excessive body cooling even if the worker is not shivering.
- How to work safely.

6.6 Guidelines for the management of hazardous substances at work

What are hazardous substances in the workplace?

A substance that is hazardous or harmful to health is any substance or preparation (natural, artificial, solid, liquid, gas, vapour, micro-organism, also mixtures of chemicals) used or produced at work which can cause harmful health effects, injury or ill-health. They can cause injury, ill-health or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure in certain circumstances. Section 1 (d) of Act No. 15 of 1973 states that Group I, Group II or Group III or Group IV hazardous substance means a substance, mixture of substances, product or material declared in terms of Section 2 (1) of Hazardous Substances Act No. 15 1973 to include Group I, Group II or Group III or Group IV hazardous substance.

What does the MHSa say?

Hazardous substances at work are regulated by the Hazardous Substances Act No. 15 of 1973. Hazardous substances are health hazards and therefore Section 13 MHSa is applicable to them and which requires the owner of the mine to establish a system of medical surveillance of employees exposed to health hazards. If you use chemicals at work you must put in place emergency plan to deal with major disasters such as spills, chemical explosions and serious exposure of workers. If you are using a chemical like cyanide in mining processes, you must develop a code of practice on cyanide management at the mine using published DME Guideline for the compilation of mandatory code of practice.

Classification of hazardous substances

Hazardous substances are classified in several ways. Section 2 (1) of Hazardous Substances Act No. 15 1973 categorizes hazardous substances into Group I, Group II or Group III or Group IV.

Hazardous substances in an approved classification list (ACL) are substances that are:

- Very toxic, harmful, corrosive or irritant.
- Substances with a workplace occupational exposure limit.
- Biological agents capable of causing infection, allergy, toxicity or other human health hazards.
- Substances that are specifically regulated e.g. lead and asbestos.

Classification is based on physico-chemical properties of substances

Examples are presented in Table 10 below.

Table 10: Classification of hazardous substances based on physic-chemical properties

Symbol	Hazard	Description of hazard
E	Explosive	Chemicals that explode
O	Oxidising	Chemicals that react exothermically with other chemicals
F+	Highly flammable	Chemicals that may catch fire in contact with air, only need a brief contact with an ignition source to catch fire and has a very low flash point
T+	Very Toxic	Chemicals that at very low levels cause damage to health
T	Toxic	Chemicals that at low levels cause damage to health

Classification based on health effects

Examples include:

- Classification of substances and preparations toxic for reproduction

A substance or preparation that is toxic for reproduction has specific properties that impair the male reproductive functions or capacity (fertility) and induce non-heritable harmful effects on the offspring.

How you can identify a hazardous substance?

It is the duty of the employer to identify the hazardous substances intended for use at the mine. There are a few things you can do to identify the type of substance you are introducing in the workplace and what it does to the health of any person who is exposed to it, for example:

(i) Conduct a preliminary risk assessment

Walk through survey to make an inventory of chemicals used

- Identify each potentially hazardous substance.
- Examine the labels and safety data sheets of the substances used in your workplace. Manufacturers and suppliers have a duty under MHSa to provide those documents which show the nature of the substance, how an employee is exposed to its risk (e.g. by inhaling it, body contact or swallowing) e.g. whether it can cause cancer or damage to the hereditary genetic system of an employee exposed to it and the precautions to be taken if a person is exposed to it.
- Check guidance notes.
- Evaluate the likely significance of the hazard.
- Identify the control measures in force
- Monitoring identify the effectiveness of the control measures.

Suitable and sufficient risk assessment of hazardous substances

When conducting a suitable and sufficient risk assessment of hazardous substances such as chemicals in the workplace you should consider the following things:

1. Reference to MSHA and Regulations, COPs, DME Guidance notes, materials safety data sheets for the danger symbols, risk and safety phases of the chemicals.
2. The physical and chemical properties of the substance e.g. the volatility if it is a solvent.
3. The routes of entry or exposure e.g. by inhalation, skin absorption.
4. The health effects e.g. irritation of skin, eyes, respiratory tract and toxic effects if they enter blood stream.
5. Who are exposed, the number exposed and extent of exposure, susceptible persons e.g. pregnant women and persons with re-existing medical conditions.
6. Whether there is a WEL assigned to the solvent.
7. The need for monitoring controls and health surveillance.
8. The need to assess the additive and synergistic effects of multiple exposures.
9. Nature, adequacy and efficiency of existing controls.
 - a) The overall monitoring strategy that could be used to assess the actual exposure of workers including:
 - Atmospheric monitoring to establish level of airborne concentrations of solvent vapour.
 - Biological monitoring.

Suitable ways of monitoring exposures to hazardous substances include:

- Personal sampling to measure levels in the breathing zone of the workers; static sampling to measure concentrations in specific areas of the workplace. These data gives possible exposure levels by inhalation.
- Biological monitoring to obtain the total exposure hidden in the body of workers by measuring concentration in body fluids.
- Deciding who is to be monitored and for how long and when monitoring should be carried out.
- The sampling methods (grab sampling, stained tubes or integrated sampling using pump, passive absorption tubes).

Use the results to determine the acceptability of such exposures and whether current controls are working properly:

- By comparing monitoring data against the occupational exposure limits.
- Measurements obtained can be used to evaluate the suitability of work practices and need to review them.
- Results can be used to compare with exposure standards set in-house or by other organisations in the mining industry.
- Data may be used to calculate or estimate additive and synergistic effects of multiple exposures (different solvents).
- Comparison with previous results.
- The measurements can be reviewed against engineering controls such as local exhaust ventilation performance tests or PPE selection and use.
- The data can be reviewed against the results of health surveillance.
- Comparison with biological standards.

Labelling, packaging and material safety data sheets

What is a label?

A label is a written, printed or graphic material that is firmly attached to the container of the substance.

What is the importance of the label?

- The label draws the attention of the person handling or using the chemical to the dangers of the chemical.
- It tells you more about the dangerous substance that is in the chemical and what it can do to your health.
- It will also give you the safety measures you must observe when handling or using the chemical.

When you purchase a dangerous substance, make sure that its label has the following information:

- The name and complete address of the supplier, or manufacturer, the distributor or the importer.
- The name of the substance as listed in the list of dangerous substances.
- The nominal quantity, mass or volume of the contents.
- The batch identification, which can be a bar code.
- The danger symbol including an indication of the danger involved in the handling and use of the substance or preparation for example: *E for explosive with a symbol of an exploding bomb.*
- Standard phrases indicating the special risks that arise from such dangers for example: *C for corrosive- danger symbol depicting the damaging effects of acids and alkalis.*
- Risk phrase R27 very toxic in contact with skin.
- Safety phrases: S28 After contact with skin, wash immediately with plenty of clean water and contact your doctor, etc.
- Standard phrases indicating the safety advice with regards to the use of the substance e.g. S28 above.
- Hazard class.
- Any additional information required by law.

Packaging

Packaging is the container that is used to protect, handle, deliver and present goods from the producer to the user or consumer. When you purchase substances for use at the mine, make sure the packaging is well constructed and closed to prevent deformation, leakage or sifting of the content due to vibration, stacking, impact or changes in environmental conditions such as temperature, pressure or humidity.

Substances and preparations that are dangerous or harmful to the aquatic environment are assigned the symbol **(N)** with the indication "*Dangerous to the environment*" and the appropriate risk phrase-

R51 Toxic to aquatic organisms.

R53 May cause long-term adverse effect in the aquatic environment.

R50 Very toxic to aquatic organisms

- Mutagens categories 1 and 2, danger symbol T and indication of danger “Toxic” Risk phase R46 may cause heritable genetic damage.
- Category 3 mutagen symbol (**X_n**) with indication of danger “Harmful” Risk phase 40 possible risk of irreversible effects.

Check the material safety data sheet (MSDS)

The MSDS gives information to users of the substance to enable them to take the necessary steps to protect health and safety and the environment. The MSDS provides information that:

- Identifies the substance or preparation and the company or business entity.
- Identifies the hazards of the chemical e.g. Toxic
- Specifies the ingredients of the substance.
- Specifies the physical and chemical properties of the substance and whether it is stable or can react with other chemicals.
- Gives the toxicological information or how it can affect the living organism e.g. Risk phrase R27 very toxic in contact with skin.
- Indicates how it can affect the environment, e.g. toxic to aquatic life e.g. R51 Toxic to aquatic organisms.
- Specifies how to transport and dispose of the substance safely.
- Indicates how to handle and store the substance safely.
- Indicates the first aid measures to take in case of exposure to the substance e.g. in case of contact with face, rinse properly with clean cold water and contact your doctor: S28 After contact with skin, wash immediately with plenty of (specified by the manufacturer).

Harmful and adverse effects of hazardous chemicals

Depending on the toxicity and amount of substance, risk to health can be acute (short-term), chronic (long-term) or both. The effect can also be additive.

- Acute effect occurs from a single contact causing serious effects or death either immediately or after some time.
- Chronic effect occurs from repeated contacts, even at low level, causing harmful effects or even death.
- Both short and long term effects could occur.
- An additive effect results from mixed or consecutive contacts with different substances.

Hazardous substances are a real danger to health and can do damage that cannot be reversed on exposed employees. Such consequences can be:

- Mutagenic by changing the genetic material that determines the heritable characteristics of living cells in the person.
- Carcinogenic by causing human cells to grow uncontrollably resulting in cancer if the growths become malignant.
- Reproductive when they impair fertility or cause damage in the development of the offspring before conception, during pregnancy or after birth.
- Allergenic by causing hypersensitive conditions in humans.

Controlling hazardous substances at work

Control measures include:

The best option is always to avoid a harmful substance altogether, or substitute the substance with a less harmful one. When it is not possible to eliminate a chemical or substitute it with an alternative substance that is less harmful, then your action should be directed towards reducing exposure of employees to the substance to as low as reasonably practicable.

- Try to reduce the quantities of the substance you use.
- Search the market for safer physical form of the substance; for example, buy used pellets or flakes rather than the powder form.
- If this is not possible try to change your processes or use engineering systems to reduce exposure for example:
 - Enclose the system or process to remove it from workers.
 - Automating this system or if not possible, partially enclosing it to reduce the number of workers who get exposed.
 - Providing local exhaust ventilation (LEV) to control exposure at source.
- Use sealed or closed containers to store the chemical and it is good practice to store a larger quantity rather than smaller amounts of the substance so that you can control exposure better.
- Label the materials correctly and restrict the areas you use them by putting signs showing the zones and restricting entry only to authorized persons.
- Manage wastes correctly by labelling them clearly, storing them in secured containers to be removed only by authorized contractors for safe disposal.
- You can use other administrative controls such as reducing the number of workers operating in the exposure area by rotating workers to other jobs as well as limiting access only to authorized persons.
- Take precautions to limit contamination. For example, ban eating, smoking, drinking in the restricted areas and make sure workers are provided sufficient facilities to wash.
- Carry out adequate monitoring of exposure levels and how well your controls are working by checking personal exposure through medical surveillance and checking workplace concentrations.
- Provide sufficient information, instruction and training to workers about the nature of the chemical, the health effects and the controls in place. The MSDS should be made available to employees.
- PPE should be provided in combination with other control measures.

Personal protective clothing and equipment (PPE)

PPE for use when handling chemical substances must be carefully selected. There are some factors that you need to consider when selecting PPE for: Hands, face and eyes and the rest of the body.

Factors to be considered for selecting protective gloves for the hands:

- The resistance to the chemical and the breakthrough time of the chemical.
- The length of time that the gloves had to be worn.
- The level of skill required for the task.
- The length of the gloves to ensure adequate protection.
- The duration of the gloves.
- The need to ensure that a suitable range of sizes is available for various users.

- The need to identify any employee allergies to the glove material or any other skin problems.

Selection of eye protection needs to consider:

- The risk of splashing the face and eyes.
- The provision of instruction on the use of goggles to face shields.
- The level of chemical resistance of goggles and face shields.
- Compatibility of goggles, face shield with other PPE if required.
- The need for fit testing of goggles and face shield.

When selecting body protective equipment such as aprons, overalls and foot wears consider:

- Compatibility with the chemicals.
- Sizes fit and comfort of users.
- Duration of use, workplace environment conditions, etc.

For skin, eye and body protection, factors such as consultation and user trials, conformity to appropriate performance standards and SABS marking; and chemical resistance would have to be considered.

Emergency preparedness and response

The MSHA requires you to put in place an emergency plan for responding to foreseeable emergencies arising from using hazardous substances such as employees' contamination, spillage and explosions at the mine that may arise during process work, storage, transportation or disposal of wastes. Your emergency plan should include:

- Arrangements for first aid including medical kits and supplies, trained first aiders, appropriate location of first aid facility. For example, if the chemical in use is cyanide, your first aid facility should be able to provide first aid treatment to:
 - Any suspected inhalation or skin contamination.
 - Any suspected swallowing of cyanide.
- Arrangements to provide hospital treatment for suspected exposure to cyanide
- Arrangements for cleaning of spillage to make the work environment safe:
 - Detoxification and decontamination of the spillage area.
 - Disposal of the chemical spillage and packaging which should be carried out by authorized expert contractors.
- Arrangements with local emergency authorities to coordinate activities in case of a major chemical disaster including putting in place a communication system to liaise with them during an emergency. Emergency contact numbers should be brought to the notice of employees.

Provide employees information and training in the use of these procedures.

Summary of what to do to control exposure from hazardous substances at work include:

- Assess the risks.
- Decide what precautions are needed.
- Prevent or adequately control exposure.
- Ensure that control measures are used and maintained.

- Monitor exposure.
- Carry out appropriate health surveillance.
- Prepare plans and procedures to deal with accidents, incidents and emergencies.
- Ensure that employees are properly informed, trained and supervised.

Purchasing, transportation and delivery of hazardous substances

It is good practice to develop and implement a purchasing policy which states the procedures for purchasing and bringing in and taking out hazardous substances from the mine. When you purchase chemicals, you import or bring in hazards to the mine and when you take wastes out, you export wastes out of the mine to the community or local environment. A procedure for managing hazardous materials at work will sort out those issues. In general, you should:

- Purchase chemicals, e.g. cyanide used in gold mineral processing from dependable and reputable manufacturers, suppliers and distributors.
- Make sure that the chemicals are supplied with their material data safety sheets (MSDS).
- Substances are transported and delivered safely: in appropriate packaging to prevent spillage and exposure of people and contamination of the environment; packaging clearly labelled including tactile symbols; off-loading and handling by competent persons and using appropriate techniques.
- Substances to be stored in appropriate containers and separated from other chemicals to avoid mixing and the risk of chemical reaction and explosion; container lids to be kept tight to prevent vapour release. Make sure only authorized persons can gain access to the storage area to limit the number of persons that can be exposed.
- Allow only competent persons to use the substance, e.g. cyanide and only competent persons should use the equipment. Make sure that the chemical is used only according to the instructions shown on its material data safety sheet supplied by the manufacturer.
- Appropriate PPE must be selected and provided to persons working with the chemical. The equipment should fit the worker properly and he/she should be thought how to use, store and maintain it and to report damaged PPE and receive fresh ones. A competent person must regularly inspect the equipment and maintain it to prevent people from being exposed.
- Ensure that leakages and spills are detected, reported and action taken in good time.

6.7 Guidelines for occupational health surveillance

What is health surveillance?

Health surveillance is a process that involves a series of techniques used to detect early signs of ill-health related to work among workers exposed to certain health risks and acting on the results obtained. Occupational health surveillance in mining affords the opportunity to:

- Assess the health status of all mining employees on a regular basis.
- Analyze the information collected to detect adverse health effects at the earliest opportunity.
- Enable appropriate and timely corrective action to be taken to protect the health and safety of mine workers.

- Provide data that can be used to carry out studies about the distribution of diseases, their risk factors and how to control them.

What the MHSA says on Medical surveillance?

Section 13 (1) (2) of the MHSA states that employers must establish a system of medical surveillance for persons who are or may be exposed to an occupational health hazard.

Section 13 (2) (a) of the MHSA states that the medical surveillance programme must be appropriate for the hazard.

Section 13 (2) (b) of the MHSA states that the medical surveillance programme should be able to provide the employee with information to eliminate, control or minimise the hazard and its associated risks.

Occupational health and occupational medical practitioners should carry out medical surveillance. If you are a small mine owner with financial constraints and you must deal with these experts following your risk assessment, it may be good idea to pool resources as a group of small independent miners to hire the services of one or more experts to assist you.

The MHSA says that your medical surveillance programme should be appropriate to the hazard. This means that it should be able to quantify the effects to health of exposure to the hazard. For example, for noise hazard, the testing of the workers hearing done by audiometric test is the most appropriate form of medical surveillance because it gives the levels of hearing loss which can be related to the worker's exposure to noise as shown also by the personal noise sampling using dosimeter (the occupational hygiene measurements). Audiometric results will help enhance the effectiveness of hearing conservation programme and therefore meets the MHSA medical surveillance requirement. A worker's medical surveillance record is therefore linked to his/her personal exposure measurements.

If it is not practicable to cover all employees, medical surveillance can be done on the basis of a group of workers representing an occupation, activity and or a workplace known as the homogenous exposure group.

Your medical surveillance programme can cover several hazards for example, for airborne particulates such as dust and diesel fumes, thermal stress (heat and cold), radiation and vibration, chemical and biological agents.

Health surveillance means the monitoring (including biological monitoring and medical examination) of employees in order to identify changes in health status due to occupational exposure to a hazard including chemicals, noise and vibration.

When is health surveillance required?

Section 13 of the MHSA states that as the employer, you must establish a system of medical surveillance of employees exposed to health hazards at the mine such as physical hazards including noise, vibration, radiation, thermal stress, hazardous substances such as dust, fumes, chemicals and biological agents.

- A regulation or notice in the Gazette may require you to establish a system of medical surveillance at the mine.
- Where your risk assessment in terms of Section 11 (1) of the MHSA indicates a need for medical surveillance, for example if it identifies a health hazard with a significant risk to the workers exposed to it.

The MSHA also states that medical surveillance must be appropriate to the nature of the hazard. This means that:

- There should be an identifiable disease that is associated with the hazard or work activity, for example noise-induced hearing loss (NIHL) in workers working in excessively noisy work areas.
- There are appropriate methods, which the occupational health practitioner will use to identify the disease, e.g. audiometric tests to detect hearing loss.
- In the current conditions in the work areas, workers operating in them are likely to suffer from NIHL
- Medical surveillance will be an additional measure to protect workers' health.

Procedure for Health Surveillance

It is good practice to develop a health surveillance procedure in consultation with the health and safety representatives, health and safety committee and employees. The procedure should set clearly the roles and responsibilities of management, occupational health practitioner or service and the human resource department. It should specify the following:

- How results of medical surveillance are to be handled, recorded and stored, especially with regard to individual medical information.
- An agreed policy on redeployment of an employee whose continued fitness for work is affected by the outcome of medical surveillance.
- The requirement for informed consent to be obtained from each employee to participate in medical surveillance.
- The consequences if an employee refuses to participate in medical surveillance.

Objectives of conducting Health Surveillance

- To protect the health of employees by detecting early adverse changes that may be attributed to exposure to substances hazardous to their health.
- To assist in the evaluation of measures taken to control exposure.
- To collect, maintain and use data for the detection and evaluation of hazardous to health.
- To assess, in relation to specific work activities involving micro-organisms hazardous to health, the immunological status of employees.

Types of health surveillance procedures to achieve the objectives

1. *Biological (exposure) monitoring*

- Measurement and evaluation of the levels of hazardous substance e.g. chemical or its metabolites (break-down products) in body tissues, body fluids (urine, blood) or in exhaled breath of an exposed person in order to quantify actual exposure. Examples:
 - Test for reduced lung function in workers exposed to silica and coal dust.
 - Testing for blood lead level in workers who carry out operations in mines containing lead ores.
 - Audiometric tests for workers exposed to excessive noise levels to detect early signs of NIHL.
 - Observing the skin for dermatitis due to exposure to mineral dust.
 - Provision of information to workers about new risks that may make them more susceptible for example cardiovascular disease, asthma.

2. *Biological effect monitoring*

- Measures and assesses early biological effects before the health of workers exposed is impaired.

3. *Medical examination*

- Use of standard clinical and medical assessments, tests and other techniques to assess the presence of early or long-term disease by a registered occupational health medical practitioner. This is carried out at set intervals and includes:
 - Assessment of medical history of the employee.
 - Occupational work and assessment of previous exposure history.
 - Physical examination.
 - Lung function tests.
 - Radiography (chest X-ray)
- Make enquiries about symptoms: Inspection or examination by a suitable qualified person e.g. an occupational health nurse.
- Review of records and occupational history during and after exposure: To check correctness of the assessment or risk to health, and to indicate if the assessment needs reviewing.

Aim: to determine the level of exposure for example to silica or asbestos.

Selecting the monitoring methods or combination of monitoring methods to use for health surveillance depends on the type of substance or activity to which workers are exposed, the way they are exposed (e.g. by inhalation, ingestion (swallowing) or skin contact) and whether it is possible to carry out biological exposure monitoring (whether valid methods exist to detect metabolites) rather than medical examination which is after exposure.

The MHSA is specific, medical surveillance is required for hazards to health including physical hazards, airborne pollutants, and biological agents at the mine. The MHSA requires you to integrate medical surveillance with occupational hygiene programme so that occupational hygiene measurement results are linked with the medical surveillance outcomes of employees.

A health surveillance programme at the mine should include:

- 1) Programme for occupational health monitoring:
 - Pre-employment or initial medical examination
 - Routine medical examinations
 - Fitness for work/disability assessment following long period of illness
 - Exit medical examination
- 2) General health screening (as part of general workplace health promotion activities)

What are the various forms of health surveillance?

1) Pre-employment or initial medical examination

The pre-employment or initial medical examination is aimed at making sure that the new recruit is fit for his/her job and will not be a danger to himself or others. The examination is conducted on all prospective full-time, part-time and temporary employees, most particularly those who will have to work in the risk areas at the mine to establish before exposure

whether the individual already has any defects which could lead to health risks in the job. Initial medical examination is important in:

- Providing baseline information about the health status of the employee against which subsequent checks will be made. For example, lung function or spirometry tests are done on workers who may be exposed to silica and coal dusts and harmful fumes, and audiometric tests on those workers who will be exposed to excessive noise levels that may lead to noise-induced hearing loss (NIHL).
- Promoting employee health by detecting diseases that are not related to their work including hypertension, diabetes, cardiovascular problems and providing them with treatment.

2) Routine/periodical medical assessments

Periodic medical assessments are required by MSHA regulations and should be appropriate for the nature of the hazard. The informed consent of the employee is required before the examination and he/she must be told the purpose of the test or examination, the possible consequence of taking or not taking the test and the action that may be taken if results are abnormal.

Various procedures are carried out:

- a) Health assessment which includes the medical history of the worker, physical examination and special investigations depending on the risk or exposure. For example, audiogram for noise exposure; and lung function or spirometer tests for those exposed to silica dust or asbestos and chest X-ray
- b) Special medical examinations can be carried out on any employee who reports abnormal signs or symptoms that may be work-related to determine whether:
 - To allow the worker in current job.
 - To transfer the worker to another area without the exposure.

People working in risk areas such as noise zones, respirator zones, shift workers and drivers are tested annually.

Medical examination results gives you the employer direct reading whether all your measures to control exposure including engineering, administrative measures, provision of information, training and supervision, PPE and the occupational hygiene and medical surveillance programmes are working properly so that you can introduce improvements to keep exposure to acceptable levels.

3) Exit medical examinations

Exit medical examinations are required by the MSHA Regulations and should be carried out on employees:

- Who have been permanently transferred out of the risk area?
- Who are leaving employment?

The examination is aimed at making sure that no substance or process to which an employee was exposed did not affect his or her health.

Records of medical surveillance

MHSA stipulates that medical records of all employees must be kept and updated regularly. Records should be retained for a minimum of 30-40 years depending on the type of investigations and should include:

- Previous employment history.
- Job category.
- Length of service.
- Smoking habits.
- Results of specific physical examination e.g. No evidence of dermatitis, No nasal ulcers, etc.

Records are important because some occupational diseases can take longer than 20 years to develop and silicosis for example will progress even after exposure has stopped. When disease occurs after a prolonged period, records should be available in an appropriate form for compensation purposes.

Who is responsible for medical surveillance?

As the employer, you are the key role player in the management of health and safety at the mine and therefore have primary responsibility to ensure medical surveillance of employees who are exposed to hazardous substances. MHSA regulations require you to integrate the medical surveillance programme with the occupational hygiene measurement programme so that occupational hygiene results can be linked with medical surveillance outcomes as an effective way of controlling exposure to hazardous substances at the mine. The occupational health practitioners conduct the medical surveillance activities and are appointed with the required qualifications in terms of Section 7 (3) of the MHSA.

6.8 Guidelines for safe systems of work and work in a confined space

Safe systems of work

What the law says?

S 11 (2) MHSA requires the owner of the mine or the employer to determine measures in consultation with the Health and safety committee to eliminate or if not possible, reduce risks after risk assessment and hazard identification. Some of these measures will include changing the way work is organised and developing safe systems of work. Safe systems of work are specific rules or work procedures which you as the employer, (in consultation with your employees), must put in place to be followed by everyone when carrying out their daily tasks in order to make sure that work is done safely and effectively.

What safe systems of work are and their importance in managing risks?

Work procedures are step-by-step instructions or method statements describing the way a task must be done so that the health and safety of the worker, colleagues or any other person are not put at risk. Safe work procedures help you to effectively control risks and should be developed for critical tasks including the operation of all plant machinery and equipment and other non-routine tasks with safety concerns such as maintenance.

Example:

Regulation [8.5(1)] of the MSHA states that you must take reasonable measures to make sure that no person is injured due to failure of any lifting equipment or lifting tackle at your mine. What the law is saying is that this is a work process, which if left uncontrolled will result in safety problems including injuries. Hence, a vital measure to take to reduce or minimise the risk of injury if you operate a lifting tackle or other lifting equipment at the mine is to develop and put in place a written safe procedure for installing, using, maintaining, inspecting, testing and keeping of records of the equipment and reviewing the procedure whenever changes occur [Regulation 8.5(2)]. You should consult the people who operate the equipment when developing the procedures. By looking at your work operations and processes at the mine and making sure that your employees are trained properly; you can prevent injuries and illnesses at work.

If you develop and put into practice correct procedures, they will help you:

- Make sure that work is done correctly and promptly.
- Give operators correct instructions and supervision.
- Check the performance of operators to know how well you are doing in health and safety.
- Use the procedures as a baseline for investigating an accident if one occurs.

Some guiding principles for developing and implementing safe work procedures

It is good practice to apply the following principles to make sure that the work procedures you develop and implement are effective in controlling risks at the mine. You should:

- Select a job, operation or process and develop procedures specific to it, making sure that you consider the correct sequence of operations including materials and products to and from various work positions. The job may consist in repairing a head-pulley on a conveyor or operating a bulldozer on a high wall bench at the mine.
- Involve the people who are doing the job or task because they have a better understanding of the task and its risks. You must remember that the law requires you to consult the health and safety committee when developing the rules or procedures
- Make sure that the work environment is healthy and safe for work procedures to be successfully implemented e.g. lighting is appropriate, ventilation and heating systems avoid humidity and temperature extremes and allows air to circulate to all areas of the workplace and noise levels are kept within the legal exposure limit.
- Make sure procedures are put in writing and in clear, simple language, which workers can understand, and if possible, communicate procedures in the language the people who work for you understand best. Employees must be trained to be aware of the rules in order to apply them.
- Make sure the reasons for the procedures are clearly explained to your employees and make obeying rules at the mine a condition for employment.
- Clearly state the disciplinary action to be taken in case anyone breaks a rule. For example, state that all rules should be observed without exception and no violation shall be tolerated; indicate the penalties if any for offenders and the fact that prompt action shall be taken and records kept
- Make sure you review procedures on an on-going basis especially if changes in work processes or new equipment are introduced.

What to do to establish correct safe work procedures?

The best way of developing a correct safe work procedure is to identify a specific job, split the job into specific tasks or steps, identify hazards in each of the steps and then write out the safest way of doing the job that eliminates the risks or if not possible, reduces the risks to the minimum. This is another form of hazard identification, risk assessment and control called job safety analysis (JSA) usually done by observing the worker doing the job. You need to take the following steps when carrying out a JSA:

1. Select the job

It is good practice to do a JSA of all your critical jobs as a priority. Your critical jobs are the high risk ones and could include:

- Tasks where you record frequent accidents, injuries or illnesses, e.g. drilling.
- Tasks with potential for severe injuries or illnesses, e.g. installing, using, maintaining, inspecting and testing a lifting equipment or lifting tackle.
- New jobs or those jobs that you have modified.
- Non-routine or jobs that are not carried out frequently, e.g. maintenance of work equipment, repair and cleaning.

How do you identify critical jobs?

You identify the critical jobs at the mine by:

- Drawing on the experience of your line managers, supervisors and consulting the health and safety committee, representatives or operators doing the job: Discuss with these people so that they prepare a list of hazardous jobs, rank them and determine the priorities that you will develop initial safe work procedures for.
- Examining your injury and incidents records
- Checking the estimated potential for serious consequences or injuries if something went wrong.

2. Break down task into a sequence of steps

It is good practice to watch the job being done, and then break down the task into steps in the correct sequence. You should consult the person doing the job and check whether the steps are all necessary or could be combined, simplified or substituted before proceeding to the next stage.

3. Identify potential hazards in each step by:

- Referring to injury/incident and near miss records
- Watching the workers and equipment and discussing with them and listing the things that could go wrong
- Checking work environment factors that could be significant for safety during work, for example:
 - Materials being used that could be hazardous.
 - Whether temperatures (heat or cold) could be a problem.
 - Whether lighting and noise could be a problem
 - Whether ergonomic problems are present (lifting of heavy loads, bending or twisting (awkward postures), prolonged standing, sitting, etc.) which affect the way work is done

4. Identify ways to eliminate or control hazards in each step

Remember that the MSHA requires you to use the hierarchy of control to list what should be done to make the task safer: can it be eliminated altogether or substituted with a safer way of doing the job? Or will you have to alter the task or introduce safeguards in the way it is carried out in order to reduce the risk of the hazard?

5. Write down the work procedures so that the safeguards are included. The safe work procedure should show:

- An outline or description of the task, stating the normal sequence of actions needed to do the work
- The hazards, if any, involved in carrying out the work, for example, equipment and tools with potential vibration and noise hazards
- Ways to eliminate or reduce the risk and the type of personal protective clothing and equipment (PPE) that should be used.

A good description of a hazard scenario will show the environment where it is happening, who is being exposed, what may precipitate or trigger the hazard and the consequence e.g. injury if the hazard should happen including other contributory factors indicated in step 3 above. An example of how to use a job safety analysis and prepare a safe work procedure is provided in Table 11 below. Continue the exercise for steps 2 and 3.

Table 11: Example: Development of a safe work procedure using JSA

Task: Grinding Iron Castings in a Metal Engineering workshop		
JSA Completed by:	Date:	
Task Breakdown and description	Identify the hazard(s)	Determine the control measures
<p>Step 1 Operator reaches into metal box located to the right of the grinding machine, grasps a 15-pound casting and carries it to the grinding wheel. Operator grinds 20-30 castings per hour</p>	<p>Hazard 1: On picking up a casting, the operator could drop it onto his foot and the casting's weight and height could seriously injure the operator's foot or toes</p>	<p>-Remove castings from the box and place them on a table next to the grinder -Wear steel-toe shoes with arch protection -Wear protective gloves that allow a better grip -Use a device to pick up castings</p>
	<p>Hazard 2: Castings have sharp burrs and edges that can cause severe cuts or lacerations</p>	<p>-Use device such as clamp to pick up castings -Wear cut-resistant gloves that allow a good grip and fit tightly to minimise the chance that they will get caught in grinding wheel</p>
	<p>Hazard 3: Reaching, twisting and lifting 15-pound castings from the floor could result in a muscle strain to lower back</p>	<p>-Move castings from the ground and place them closer to the work area to minimise lifting. Ideally, place castings at waist level or height or on an adjustable platform or pallet -Train workers not to twist while lifting and redesign the</p>

		workstations to minimise twisting during lifts.
Step 2 Push casting against wheel to grind off burr or sharp edges	Hazard 1:	
	Hazard 2:	
Step 3 Place finished casting in box to left of the machine	Hazard 1	
	Hazard 2:	

(Adapted from OSHA, 2002)

Keeping records of safe work procedure(s)

The original of the procedure document is usually stored at the central documentation office but a copy of the procedure should be kept on the job so that workers can make reference to it when needed. Though procedures are permanent instructions, you should review them periodically on an on-going basis to keep them up-to-date. Generally, a new procedure will need to be developed and workers trained in its use in the following circumstances:

- When an accident has occurred on a job falls under the provisions of that procedure.
- If one of the steps of the job has been changed.
- The job process has been changed.
- A recent inspection, for example by the health and safety committee, reveals that workers are not doing the job according to the procedure in place.

Other safe work procedures

a) Permit-to-work

What is a permit- to- work?

A permit-to-work is a formal document issued by a competent person to a worker assigned a job with associated high-level risks and in which complex safeguards have to be taken by following a safe system of work specific to that type of job. The permit-to-work is therefore a form of control to make sure that all the elements of a safe system of work are in place before work begins and are followed when carrying out the task. It is good practice to issue permits for such activities as:

- Entry or work in a confined space and one which may involve a temporary task with a high level of risks. Activities of workers inside and operators outside have to be coordinated using special communications systems to ensure the safety of those carrying out the task.
- Undertaking work on high-tension electrical systems or installations such as generators where work may have to be done “live” and the safe work procedure needs to be strictly followed.
- Maintenance of specific high risk plant, e.g. conveyor system in which maintenance work is to be done with guards removed and a safe work procedure is needed to prevent serious injuries.
- Work being carried out in flammable atmospheres such as welding or hot work on tanks and containers that may have residues of flammable materials and chemicals presenting high risk of fire and explosion or toxic chemical release.

What you need to do to maintain an effective permit-to-work system for high risk tasks at the mine?

Remember that a permit-to-work is a control procedure to make sure safe work procedures are followed in a high-risk task. To achieve this aim, you must put in place a permit-to-work system that is effective and works properly and is understood by the people responsible for the tasks. You should:

- Clearly define the tasks and areas for which permits will be required and conduct suitable and sufficient risk assessments for those tasks and document the findings and control measures.
- Develop the permit-to-work procedure in which you define how the system will work:
 - Description of the job
 - Hazard identification and risk assessment
 - Risk control measures
 - Time limits and authorising of permits
 - Receiving and cancellation signatures of permits
 - A unique reference number for each permit
- Make clear arrangements for returning permits and keeping records.
- If situations could arise in which multiple permits are on-going simultaneously, then you must put in place proper arrangements to display your multiple live permits to avoid accidents.
- Identify training needs and deliver training to persons authorising and receiving permits and those working in areas covered by permits.
- Make sure that arrangements exist to allow permit holders to effectively communicate between shifts.
- Ensure that you provide the technical support for safe working when a permit is in operation, e.g. provide equipment for lock out, isolation, testing of gas in confined spaces, etc.
- Put in place procedures to monitor and review the operation of the permit-to-work system in order to make improvements.

b) Some basic safe work procedure steps that should be taken on an on-going basis include:

- Planning every task before work begins.
- Training employees in the skills they need to work efficiently and safely
- Providing employees information about hazards and their risks and measures that have been put in place to control the hazards.
- Designating clear work areas to avoid bumping into or tripping over things. It is good practice to develop and put into practice a housekeeping policy.
- Providing PPE to workers and making sure these are worn, properly stored and maintained. It is also good practice to develop and implement a specific policy for the selection; provision, use and maintenance of PPE making sure that the specific needs of female employees are taken into account.

6.9 Guidelines for work in a confined space

What is a confined space?

A confined space is an enclosed or partially enclosed space which is not designed or intended to be a workplace but which a person may need to enter to carry out some work processes. A confined space is a high risk place to work in for reasons that include:

- The means of entry and exit from the confined space may be particularly small or restricted.
- The space may not have adequate ventilation to sustain a worker's breathing if he has to work in it and this can lead to asphyxiation due to lack of oxygen.
- The space may lack oxygen or contain gases resulting from chemical and biological reactions within it and can lead to asphyxiation of a person working in it or direct body contact with corrosive residues of chemicals leading to injuries and skin problems such as dermatitis.
- The space may contain poisonous, flammable or suffocating gases or vapours that were routinely stored in it presenting a risk of fire and explosion if an ignition source were introduced during entry.
- The space may contain liquid and a worker can drown in it or other solid materials such as sewage that may not support a person causing him to be submerged or to suffocate.
- Workers can sustain electric shock from portable equipment such as lights and tools taken into the space for work
- The space can contain physical hazards including extreme temperatures, slippery surfaces on which workers could slip and fall and sustain injuries. Workers could sustain injuries from falling objects and tools as well as bites from poisonous animals such as snakes and rodents.

Types of confined spaces

There are various types of confined spaces that may be found in a mine environment that require special safeguards or precautions to be put in place before entry or work can be done in them. These include:

- Silos
- Stockpile reclaim tunnels
- LPG vessels
- Storage tanks
- Open-topped spaces (degreases or pits with no good natural ventilation)
- Pipes, sewers, tunnels, shafts and ducts

What the MSHA says and what you must do to make sure that work in confined spaces is safe?

Section 11 (1)(2) of the MSHA requires the employer to identify hazards to health and safety of employees, assess the risks, record the findings and put in place measures to eliminate or reduce the risks as far as is reasonably practicable. This applies to work in confined space or confined space entry.

When work has to be done in a confined space, a hazard identification and risk assessment must be undertaken and a safe system of work or safe work procedure developed for the specific task. A permit to work must be issued to the competent person responsible for the task as evidence that the issuer is satisfied that all the elements of the safe system of work are in place including standby persons and emergency response arrangements for work to be undertaken safely.

When work in confined space is completed, the site must be re-inspected and permit closed by the issuer signing it again.

Example precautions you need to take when carrying out welding work in a confined space.

- Provide adequate ventilation before work in a confined space.
- Make sure gas cylinders and welding machines are left outside the confined space.
- Make sure that heavy portable equipment that has been mounted on wheels is securely blocked to prevent roll over into the space and injuring welders.
- Provide the means to quickly remove welders entering a confined space through very small openings or manhole in case there is an emergency. Attach a safety belt to the welder's body in such a way that the body does not get jammed in the small exit opening during rescue.
- Station a competent person outside who knows the rescue procedures and has the necessary experience to observe the welders at all times during the operation and should initiate rescue actions when the need arises.
- Welders must follow the required safety precautions for their tasks, for example, removing electrodes from holders; disconnecting machines from power when welding work will be interrupted for an extended period, etc.

6.10 Guidelines for emergency preparedness and response

What is an emergency?

An emergency is an abnormal, dangerous or life-threatening situation, event or set of circumstances that may happen in the mine requiring immediate action to remedy or deal with it, e.g. action to evacuate or ensure recovery of persons; action to protect people from injury or harm; and action to protect property, the working places, environment and nearby mines or communities from damage. Emergency situations can be caused by natural disasters such as seismic activity e.g. earthquake, acts of terrorism, violence or from the hazards of the operations at the mine.

Determine the types of emergencies that may happen in your mine. The first place to look is your hazard identification and risk assessment (Sections 10 and 11 (1) (2) of the MHSA).

- Develop your emergency preparedness capabilities.
- Develop your emergency response plan.
- Types of emergencies:
 - Chemical spill
 - Fire and explosion
 - Rupture of gas, water or fuel lines
 - Medical emergency
 - Flood
 - Violence
 - Power failure
 - Bomb threat

Types of emergencies that may occur in a mine include:

- A serious injury to a person at the mine (medical emergency).
- A fire that cannot be controlled.
- Spillage, loss or exposure to hazardous materials or chemicals.
- The workings of a mine fail.
- A person is trapped at the mine.
- Accidental ignition or explosion of dust.
- A gas explosion.
- Damage or failure of shaft and shaft equipment.

- Machinery going out of control.
- A dam or tailings storage fails.
- Water, gas or mud inrush.
- Violence.
- Natural disasters such as seismic activity or earthquake, flood, rain storm, wind, lightning, bushfire.
- Sabotage.

Why you need to prepare for emergencies?

If an emergency happens and you do not have capacity to deal with it the consequences can be disastrous for the people who work for you and possibly neighbouring mines and communities. They can result in multiple casualties, environmental and property damage including possible financial collapse of the mine. The Mine Health and Safety Inspectorate Guideline on the compilation of a mandatory code of practice for emergency preparedness and response recommends that mine owners use a four-element management model to manage emergencies at the mine:

1) Prevention

It is preferable to take measures to prevent risks including emergencies from occurring or measures to reduce the effects on the mine and/or community when events do happen.

2) Preparedness

All the activities which you undertake to prepare the mine and/or community to deal with emergencies in event they occur.

3) Response

All emergency response activities which you undertake following the impact of an emergency including the actions taken immediately prior to impact for an event that has some warning.

4) Recovery

All activities that you undertake to return the mine and/or community to normal after the impact of an emergency.

These elements are not exclusive. They may overlap particularly between prevention and preparedness and response and recovery elements.

Emergency management will help you to:

- Prevent fatalities and injuries.
- Reduce damage to personnel, buildings, equipment and the environment.
- Make recovery and resumption of normal operations following an emergency easier and faster.

Planning for emergencies is an indication that you care for the health, safety and wellbeing of your workers and can help you identify hazard conditions that could worsen an emergency situation including common issues such as panic, the need for making decisions quickly, shortage of time, poor judgment due to pressure, lack of resources and insufficient training

and a breakdown of normal channels of communication and authority can turn an emergency into a full disaster.

What the law says?

It is the responsibility of mine owners to develop emergency preparedness and response plans and procedures to reduce the risk and impact of emergencies. As a mine owner, you must comply with Section 11 (1) of the MSHA requiring you to identify hazards, assess their risks to the health and safety of your employees and record the significant hazards and risks assessed. You must then apply Section 11 (2) of the MSHA which says that in order to deal with the hazards and risks you should, as far as is reasonably practicable, first attempt to eliminate the risk and if not possible, control it at source, and if not possible, minimise or reduce the risk and if it still remains provide PPE and put in place a programme to monitor the risk. You should make sure the measures you have put in place are put into practice (Section 11 (3) of the MSHA and periodically review them especially if circumstances alter or you introduce changes such as new procedures, equipment, mining methods, etc. (Section 11 (4) of the MSHA. This risk management process applies to emergency situations. Your HIRA will help you to:

- Identify emergency situations that could happen at the mine.
- Determine how likely that the emergency situations could happen and plan to reduce the chance of an emergency happening.
- Prepare a COP for emergency preparedness and response at the mine which will help you:
 - Develop your preparedness capabilities for emergencies.
 - Develop your emergency response measures contained in a specific plan.
 - Develop a system of reporting and recording emergencies, measures as well as persons assigned emergency responsibilities.
 - Provide training and resources for workers to understand and control emergencies at the mine.

Types of emergencies that may occur at the mine

Your HIRA should enable you draw up a list of possible emergencies at the mine including:

- Fire
- Flammable gas and dust explosions.
- Injury, fatality, damage.
- Collapse of face and trapping of people.
- Collapse of roof and trapping of people.
- Mobile equipment accident.
- Flood, water and mud inrush.
- Chemical spill.
- Lightning strike.
- Seismic action e.g. earthquake
- Shaft failure.
- Violence.

You must remember that an emergency event can occur alone or can be connected with or cause another. For example, lightning can strike a dump truck causing it to run out of control, fall over an embankment and catch fire and then explode and leak hazardous substances.

Once you have determined the list of potential emergencies, identify the possible major impacts of each emergency such as fatalities, injuries, follow-up events such as fire after

explosion; evacuation; damage to plant, equipment, buildings and the environment, loss of vital records and documents and general disruption of work.

The list of impacts should help you develop your capacity to successfully respond to emergencies, i.e. prepare your emergency response plan, and how you will report and record emergency measures and procedures to comply with the Guideline on the compilation of a COP for emergency preparedness and response as well as return the mine to normal operation.

1. Emergency preparedness

Emergency preparedness means putting in place capabilities that will help you handle successfully any of the emergency situations that may potentially happen at the mine. In order to be prepared for emergencies at your mine, the Guideline on the compilation of a COP for emergency preparedness and response requires you to put in place the following facilities:

1.1 Detection and early warning systems

Detection and early warning systems should be installed or made available to help you detect emergency situations as early as practicably possible and to provide early and timely warning to people when an emergency occurs. Systems should suit the types of emergencies identified.

Personalised detection and early warning systems that can be provided and used Include:

- **Flammable gas detection systems:** Hand-held detection instruments such as those commonly used for routine gas detection and the more specialised ones used by the mine ventilation department should meet the requirements of SABS Standard 1515.
- **Flammable gas warning devices** are hand held or worn on the body and give an audible and visual warning when a pre-set concentration of flammable gas is detected.
- **Carbon monoxide instruments** can be either measuring instruments or warning instruments (or both). They are either hand held or (more commonly) body worn. They can be set to give an audible and or visual alarm at a pre-set gas concentration. Most have the facility to give a second alarm at a higher concentration.

For an effective use of these systems, the following must be put in place:

- Procedures for personal issue of detectors/early warning systems.
- Procedures to ensure that actual settings of alarm levels remain effective.
- Maintenance schedules, calibration and testing procedures.

1.2 Communication systems

You should provide communication systems that will help you deal with emergencies when they arise. The type of communication system and location where it is positioned at the mine

will depend on the type of emergency. Ideally you should make provision for back-up systems.

The communication system should enable you liaise with:

- People at the mine.
- Neighbouring mines and communities.
- External emergency services.

For example, you will need to consult staff, contractors if any and external stakeholders such as emergency services (ambulance service, fire brigade, hospitals, Rescue services, Police, etc.) and local authorities and businesses on the development of the emergency plan and to clearly define their roles in the event of an emergency happening.

In addition you should:

- Provide and train competent personnel to use the systems.
- Make arrangements for inspection, testing and maintaining the systems in good and effective working order.

1.3 Arrangements for the provision of emergency medical care

You are required to make appropriate arrangements for the provision of medical care to persons affected during an emergency. Arrangements should include:

- Medical facilities with adequate and suitable emergency medical equipment.
- Medical personnel trained in emergency care.
- Response schedules.
- Capacity to treat and evacuate persons with multiple injuries.

1.4 Mine evacuation and escape procedures

If an emergency event occurs at the mine, as the employer, you are required to make sure that people are evacuated or escape to a designated place of safety at the mine. You will need to draw up special procedures for rescuing or escape of persons from difficult areas such as:

- Working places with single and multiple entries.
- Surface working places.
- Confined spaces such as silos.
- Elevated places

Examples and requirements for places of safety at the mine

A place of safety means:

Any place, which, despite an emergency, can sustain life for the duration of the emergency and is adequate in size to accommodate the maximum number of affected persons likely to be present in the area served by it. Examples include:

- An intake airway commencing from surface of the mine containing no combustible material that will endanger the safety of somebody.

- Selected place e.g. cache system in the underground workings where additional self-rescue devices have been stored ready for use, sufficient in number for the number of persons and durable enough for persons using them to reach a place of safety.
- A refuge bay of a minimum floor area of 0.6m² per person able to withstand the effects of explosion, fire-protected or fire resistant and life-sustaining services installed in the bay.

When determining the place of safety, consider the following:

- Location and number of places of safety.
- Distance from working places.
- Life-sustaining facilities in places of safety: food, portable water, breathable air, etc.
- The issuing of self-contained self-rescuers.

1.5 Provision of training and awareness

All persons working at the mine and others who may be affected by an emergency event at the mine should be educated, trained and made aware of measures in place to deal with emergencies.

Content and frequency of emergency training (Section 10 (2) 9d) of the MHSa): An emergency training programme should contain the following elements:

- Procedures and actions to be taken in event of an emergency.
- Emergency evacuation drills.
- Correct procedures for the use of emergency equipment.
- Location and description of shutdown controls including lock out devices.
- Instruction in the use of belt-worn self-contained self-rescuers.
- Location of copies of emergency procedures and instructions when needed.

2. Emergency response measures and plan

2.1 Rescue and response capabilities

The employer must develop adequate capabilities to enable appropriate response in good time to emergencies and rescue people from emergencies if they happen at the mine. Such capabilities include:

- Providing adequate number of rescue personnel.
- Making arrangements for mobilisation in event of an emergency.
- Providing a variety of specialised rescue equipment and facilitating access to them.
- Making arrangements to deal with distance if the mine is remote.
- If required, making arrangements with Mine Rescue Provider and/or any other provider e.g. Rescue drill in terms of Regulation 165 (1) (c) of the MHSa).
- Providing instruments, equipment and trained persons, for example, providing the means to detect carbon monoxide, carbon dioxide, flammable gas and oxygen and ancillary rescue equipment.

Example, how to respond to an incident involving an inrush of water, mud or gas

The mine should have a written procedure in place, detailing action to be taken in the event of an inrush. This document should cover at least the following:

- Action to be taken by persons immediately affected by the inrush, this should be part of the initial and refresher training.
- Establishment of a control and notification of management.
- Summoning adequate rescue personnel.
- Evacuation of persons.
- Establishing the extent of the problem.
- Actions to be taken to manage the problem.

2.2 Management of emergencies

Having in place a strong capacity to deal with emergencies should be supported with an effective system of managing emergencies if they happen at the mine consisting of a well-established emergency control centre with appropriate equipment and competent personnel with clear responsibilities in event of an emergency occurring; effective emergency response plan and procedures to handle bad weather or environmental conditions that could be encountered during an emergency, e.g. heavy rain storms, causing flooding, winds, gases, heat, etc.

The Emergency Response Plan

Always remember that the safety of employees and other people comes before the protection of equipment and property. The emergency response plan is to ensure the safety of employees in the event of an emergency and should include the following elements:

1. Procedures to deal with emergencies

Emergency procedures should include:

- Procedure for issuing evacuation order and alerting employees. The alarm system should be suitable for the type of mine but one type of signal should be understood by everyone as used to evacuate the mine. For example, sirens or fire bells for surface mines and quarries and flashing lights or radio system underground.
- Procedures for the provision, maintenance and use of emergency escape routes, clear of obstructions with emergency lighting and appropriate signage to mark the exits and direction to them. Workers must be trained on escape routes and how to use them in event an evacuation is ordered.
- Procedure relating to the place of safety where people will gather so that they can be counted to make sure everyone has left the danger area; assigning responsibility to help evacuate injured or vulnerable workers.
- Procedures and adequate personnel for treating injured persons, searching for missing persons and calling for other sources of medical aid if the normal aid facility cannot be reached.
- Plan for safe shutdown or clearance of the mine explained to employees and displayed where they can see it.
- Arrangements for clean-up and returning the mine to normal operations.

2. Site plan showing:

- Work and storage areas
- Emergency assembly points
- First aid equipment locations

- Buildings and roads
- Fuel, explosives and chemical storage areas
- Fire-fighting equipment
- Access and egress points
- Fixed plant, machinery and equipment locations
- Emergency phones

3. Communication arrangements with local emergency services and authorities

It is good practice to prepare and provide the following information to local emergency services and authorities you may need to call in event of an emergency to help them prepare adequate response:

- The name of the mine and manager including the type of operation.
- Directions to the mine or operation including the map and site plan.
- A description of the work being undertaken, for example, extracting gold.
- Details of the plant and equipment used on site.
- The maximum number of persons that may be present on site at the time of an emergency.
- Details of emergency equipment on site to assist in the event of an emergency.
- An indication of the working schedules of the operation
- An invitation to external emergency services to visit your site and inspect operations and review emergency procedures in place so they know what to expect and also assist in advising you about the appropriateness and adequacy of your emergency arrangements.

4. Reporting, recording, maintenance and review of emergency systems

Once emergency preparedness and response measures and procedures are in place, systems need to be developed and put into practice to make sure that measures and procedures remain effective on an on-going basis. Arrangements must be made for:

- The inspection, testing and maintenance of emergency equipment and facilities at regular intervals. Testing will help you:
 - Identify problems that may arise during an emergency since you cannot predict all of them.
 - Conduct exercises or drills to practise all or critical elements of the emergency plan e.g. evacuation.
- Reviewing the plan after each exercise, drill or actual emergency will help you identify areas that need improvement.
- Reporting and recording in document form emergencies, emergency preparedness and response measures as well as persons assigned emergency responsibilities.

6.11 Guidelines for the maintenance of work equipment

1. The importance of maintaining work equipment in good condition of repair

Unmaintained or poorly maintained plant and equipment can lead to unsafe conditions or cause accidents resulting in serious injuries, damage to other plant, equipment and property. Sudden failure or major breakdown of a critical plant or equipment can bring operations to a halt and cause enormous losses.

2. What the law says?

If you own a mine that is being worked, Section 2 (1) of the MHSWA requires you to make sure that as far as is reasonably practicable, the mine is designed, constructed and equipped to provide a safe and healthy work environment and is commissioned, maintained and decommissioned in such a way that employees perform their work safely without risk to their health or other persons. This places a general obligation on the owner of the mine to maintain all plant and equipment for use at the mine in a safe operating condition including controls, emergency stops, guarding and excess systems.

Section 6 (1) of the MHSWA also states that the owner of a mine must supply all necessary health and safety facilities and equipment to each employee and maintain those facilities and equipment in a serviceable and hygienic condition. This means that items intended mainly for the health and safety of workers such as PPE, seats and controls on mobile machines, windows and dust seals as well as air filters and air conditioners in hot and dusty environments should receive higher priority for maintenance.

For routine maintenance tasks, checklists should be developed and used and records kept. You can use example checklist developed by DMR for operation and maintenance of trackless mobile machine (TMM).

3. Plant, machinery and equipment maintenance strategies

- Planned preventive maintenance.
- Reactive (breakdown) maintenance.
- Condition monitoring.
- Emergency maintenance.

3.1 Planned preventive maintenance

This is a proactive strategy to maintain your machinery and equipment at regular schedules before problems occur or parts deteriorate and have breakdown.

- Maintenance is planned and executed at regular intervals.
- Parts are replaced according to a time schedule or number of running hours before they wear out.
- A maintenance record is kept as a routine.

Planning and maintaining your plant and equipment at regular schedules is an effective way of extending their useful life and improving the reliability of their components or parts. This also reduces the potential for unexplained breakdowns and costly accidents. Planned maintenance allows you opportunity to control maintenance costs and ensure your resources are utilized rationally and effectively.

When deciding on whether to adopt a regime of planned preventive maintenance of your plant and equipment, you should consider:

- The results of the risk assessment of the plant or equipment showing the likelihood of plant failure and the consequences of failure.
- History of failure of such equipment or plant. Consult incidence reports, maintenance log or record of similar plant.
- The manufacturer's specifications and recommendations for maintaining and servicing the plant.

- The extent to which you intend to use the plant and the condition in which it will be used.

3.2 Breakdown maintenance

Breakdown maintenance is a reactive strategy of undertaking maintenance or repair of plant and equipment when it has broken down and not when is functioning.

- Maintenance is carried out only in response to reports that the plant or equipment has malfunctioned.
- This strategy does not increase the useful life of plant or equipment and does not improve reliability of components or parts.

Breakdown maintenance is an unplanned activity and presents greater risk of injury than normal plant and machinery operation or scheduled maintenance which is planned and can benefit from down time. It is good practice to develop a breakdown procedure or a checklist for this type of maintenance work and make sure the work is properly supervised.

A procedure for breakdown maintenance should address the following items:

- Identify a competent person and assign responsibility for maintenance work.
- Identify the person to supervise the work.
- Indicate how communication and consultation with employees will be ensured.
- Show the procedure for making the plant or machinery safe before maintenance work.
- An indication of the procedure to be used to identify hazards, assess and control the risks of the maintenance task.
- An indication whether specific safe work procedure such as permit to work will be required, e.g. locks out procedure.
- Indication of the means of gaining access to the plant, e.g. using a fixed access provided, erecting a scaffold or using an elevating work platform (EWP) for work on a crane.
- How heavy plant such as TMM will be moved if the need arises.
- Provision for controlling spillage of hazardous materials (e.g. diesel, oil, grease, etc).
- Indication of the emergency equipment that will be required and where to obtain it e.g. fire extinguishers, self-contained self-rescuers, first aid kit, etc)
- Provision for controlling vehicle and pedestrian access.
- Provision of facilities for temporary storage of tools, parts and crap materials.
- Arrangements to ensure proper clean-up after work are completed.
- Precautionary arrangements for start-up e.g. making sure that all guards are replaced; all adjustments have been made, all controls are functioning properly with emergency stops operating. Start-up should be undertaken under close observation and supervision.

3.3 Condition monitoring

Condition monitoring is applied on equipment such as LEV or ventilation systems or other plant in which specific parameters of the plant or equipment such as vibration levels, noise levels need to be monitored. For this strategy to work, the level of each parameter when maintenance work should be carried out must be specified. The levels should then be measured continuously on an on-going basis or scheduled at specified intervals.

3.4 Emergency monitoring

This is a non-planned maintenance arising from an immediate need to undertake some maintenance work to prevent more serious consequences occurring. For example:

- Reinforcing installation foundations to prevent failure.
- Emergency work on face to prevent collapse.
- Fitting temporary supports to prevent the collapse of an installation such as a roof.

4. Maintenance of Mobile and Fixed plant program

The employer is required to keep all plant, machinery and equipment in good state of repair and to draw up safe operating rules for the safe start up, operation, parking and shut down of mobile and fixed plant in use at the mine. The aim of a mobile and fixed plant maintenance programme is to make sure that mobile and fixed plant at the mine are regularly inspected and maintained and a record kept. A mobile and fixed plant maintenance programme helps you:

- To meet requirement of MHSa for inspection and examination of mobile and fixed plant.
- To provide a history of maintenance.
- Assist in planning scheduled maintenance.

As part of the programme, you will need to:

- Develop a plant register, which contains a full list of plant and equipment on site.
- Allocate the type of maintenance and frequency of maintenance to be completed on all mobile and fixed plans.
- Make sure that all plant and equipment required to be inspected and maintained should be listed in the plant register (mobile and fixed plant section).
- Only persons verified as suitably competent should carry out inspection and maintenance work – the persons and their responsibilities are listed on the maintenance schedule.

Maintenance methods

1. Pre-start checks

If a problem is identified during a pre-start check record the problem and inform the person responsible. In case the problem cannot be fixed immediately, the hazard should be recorded in daily diary or action plan.

- Mobile plant: pre-start check and maintenance according to the type of plant; for example, before operating a trackless mobile machine, the operator must inspect and test such machine using checklist provided by the employer (See DME checklist for testing of brakes, lights, warning devices, condition of tyres, etc). The testing record must be kept for at least 3 months.
- Fixed plant – pre-start check and maintenance according to the type of plant.

Daily pre-start checks should be carried out using a written procedure and for a mobile plant should include:

- Lubrication and hydraulics oil levels.
- Coolant levels.

- Fuel levels.
- Functioning of controls.
- Cleanliness of filters.
- Whether brakes and safety devices are working properly.
- Electrical connections and switches.
- Leaks, wear, damage, guarding.
- Condition of tools.

2. Scheduled maintenance and frequencies

Maintenance is scheduled according to the manufacturer's service manuals or previously established systems (if service manuals are not available). You should indicate the location of service manuals for each piece of plant and the frequency of maintenance of each piece of plant should be based on information provided by the manufacturer in the plant service manual.

Documenting maintenance (Document control)

- Pre-check forms to be completed and fixed in each plant file / record book.
- Record all scheduled maintenance in each plant file/ record book.
- Record a unexpected breakdown maintenance on each plant file / record book.
- All documentation received from external service providers should be recorded in each plant file/ record book.

This is what you must do to operate a trackless mobile machine at the mine:

Before operating a trackless mobile machine the operator must:

- Inspect and test such machine using checklist provided by the employer. See DME checklist- testing of brakes, lights, warning devices, condition of tyres etc. Keep testing record for at least 3 months.
- Use a trackless mobile machine when it is in a good state of repair. The employer must draw up safe operating rules for:
 - Safe start up and operation
 - Safe parking and shut down

Maintenance

- Draw up procedures for changing wheels and for changing, inflating and repairing tyres.
- Ensure all trackless mobile machines are maintained and in sound state of repair.
- Draw up and implement safe repair and maintenance procedures for the lifting jacking and mechanical support of trackless mobile machines, supporting of buckets, high pressure cleaning and lifting of components.

Schedule maintenance, Inspections and over inspections

- Use Pres-start checklists to identify components critical for safe operation of the type of TMM – keep the checklist for at least 3 months.
- Check the conditions under which Trackless mobile machinery should be used e.g. "GO", "GO BUT" OR "NO GO" options.
- Prepare a procedure for changing wheels.
- Prepare procedures for changing, inflating and repairing tyres

- Prepare procedures for any repairs that could endanger persons.
 - Consult manufacturers repair manuals to ensure safe maintenance.
 - Adequate support of the trackless Mobile Machinery or any components which may inadvertently fall on persons.
- Prepare procedures for changing battery on battery –powered Trackless Mobile Machinery.
- Control and safe systems of work on battery changing bays.
- Address aspects such as rigging, welding, exposure to toxic liquids or fumes, dust, firefighting, fuel handling, roadways, emergency preparedness and use of hazardous substances related to the operation and maintenance of Trackless Mobile Machinery.
- Ensure competency of operators and maintenance personnel and education and training of persons interacting or in close proximity with trackless mobile machinery in accordance with section 10 (3) of the MHSA.

5. Installation and maintenance of electrical plant equipment programme

The aim of the programme is to put in place a system which allows all electrical plant and equipment used on site to be designed, installed, operated and maintained in a safe manner by competent persons with the required qualifications.

The programme covers all activities related to the installation and maintenance of all electrical equipment listed on the plant register by people assigned the responsibility and listed on the maintenance schedule.

Elements of the electrical installation and maintenance programme include:

- Competencies for electrical installation and maintenance.
 - Work to be performed by electrician with relevant trade certificates and assessed as competent from record provided showing skills and experience in using the qualifications.
 - You will the services of a qualified electrical engineer to periodically review the electrical installations if the total connected power on site exceeds 1000KW or the power supply is high voltage one (>1000volts).
- Risk assessment.
 - Identify all hazards relating to the use of electricity at the mine by conducting electrical risk assessment. Start by identifying and registering all electrical plant and equipment. Assign responsibility for identifying electrical hazards, assessing the risks and developing and documenting the appropriate controls.
- Testing and recording of tests of electrical equipment.
- Systems of work for control of electrical installations and equipment maintenance including:
 - Electrical isolation procedure and test before you touch procedure.
 - Removal and power restoration procedure.
 - Protocol to manage electrical shock.

6.12 Guidelines for the reporting and investigation of accidents, dangerous occurrences and work-related ill-health

What are accidents and dangerous occurrences?

An accident is defined in the SAMRASS Codebook for mines as an incident “where a person was injured or killed” and a dangerous occurrence is an incident where no injury took place. An accident is an unplanned event that results in a mishap such as an injury, fatality, damage to property, equipment or the environment. An accident stops the normal course of

events at a mine e.g. it disrupts the work process. A dangerous occurrence may also disrupt work but not cause an injury or property damage. For example, a 60Kg carton falls off a 6 metre high storage rack and lands near a worker. This is an unplanned incident that has the potential to cause injury and amounts to a wake-up call as the first of a series of incidents that will eventually lead to harm or damage. Studies on workplace health and safety practices show that most accidents, dangerous occurrences and work-related ill-health are predictable and preventable or avoidable since they are often the result of things people do or fail to do. Accidents result from the failure of people, equipment, materials or the environment to react in the way expected and can be prevented proactively through the hazard identification, risk assessment and control process or reactively if we plan and carry out a systematic investigation when they occur and alter behaviours. For example, by investigating why the carton fell, solutions to prevent it from falling in future can be found.

Reportable accidents and dangerous occurrences as prescribed by Regulation 23 of MHSa

Regulation 23 of the MHSa requires that the owner of a mine should report the following accidents and dangerous occurrences in the prescribed form(s) to the Mine Health and Safety Inspectorate of the Department of Minerals Resources (DMR):

A reportable accident includes an accident that result in:

- a) The death of an employee.
- b) An injury to an employee that can be fatal.
- c) Unconsciousness as a result of heat stroke, heat exhaustion, lack of or inadequate oxygen supply. Inhalation of fumes or poisonous gas, electric shock or electric burn incidents.
- d) An injury that incapacitates an employee from normal duty for 14 days or more or causes the employee to lose a joint or part of a joint or sustain a permanent disability.
- e) An injury which incapacitates the employee from performing normal duty for one day following an accident.

Delay for reporting accidents

Accidents resulting in injuries categories a, b, or c of Regulations 23.1 of MHSa must be reported immediately as fast as possible and confirmed without delay by completing and submitting forms SAMRASS 1 and 2.

An accident resulting in an injury, which incapacitates an employee from performing normal work for 14 days following an accident or causes loss of joint or part of it or permanent disability must be reported with 3 days after disability has been determined or the accident becomes reportable on forms SAMRASS 1 and 2.

An accident resulting in an injury resulting in one lost day must be reported without delay on a monthly basis on Form SAMRASS 4.

The SAMRASS Codebook provides the delay periods for reporting deaths and injuries resulting from rock-burst and fall of ground accidents.

Reportable dangerous occurrences

According to section 23.4 of the MHSa, The following dangerous occurrences must be reported immediately by the quickest means possible and confirmed by completing and submitting Form SAMRASS 1:

- Rock-bursts and falls of ground severe damaged to working face to the extent described in the regulation.
- An uncontrolled or unplanned caving, side wall or slope failure or subsidence in the ground or workings that cause damage to the surface which may potentially pose a significant risk to the safety of persons at the mine.
- Unplanned or uncontrolled flow of broken rock, mud or slimes in the mine work area that may pose a significant risk to people at the mine.
- Breakdown of any main ventilation fan.
- Any power failure that occurs underground, posing significant risk to the safety of persons in the mine.
- Fires caused by spontaneous combustion or relating to mining activities, ignition and explosions of flammable gas and dusts at the mine.
- Detection for the first time a flammable gas exceeding 14pp100 by volume in the atmosphere or any portion of the mine.
- A winding plant or its component failing or running out of control.
- Fracture or failure of driving or operating machinery such as lifts and elevations or parts of machinery.
- If an object falls down the shaft and requires an inspection.
- Events relating for emergency procedures, for example, failure of breathing apparatus, while it is deployed, the rescue from entrapment of any employee while at work.
- If a self-propelled mobile machine runs out of control and may endanger the safety of persons at the mine.
- Accidental or unauthorised ignition of explosives
- Fracture or failure of any part of a boiler or safety device of a pressure vessel which may have endangered the safety of persons at the mine.

Recordkeeping

Regulation 23.7(i) of the MSHA requires the employer or owner of the mine to keep a record of all accidents or dangerous occurrences and maintain them for two years from the time that the event became reportable. The records should show the particulars of all accidents and dangerous occurrences.

Arrangements you should put in place to report accidents and dangerous occurrences at the mine

As an employer or owner of a mine , you are required by Section11(5) of the MSHA to report accidents and dangerous occurrences that happen at the mine in the prescribed forms to the Mine Health and Safety Inspectorate. You need to put in place the necessary arrangements that will help you meet your obligation. You should therefore:

- Allocate responsibility to a competent person who will be responsible for reporting accidents and other reportable events such as reportable dangerous occurrences and work-related ill health or diseases.
- Make sure that the arrangements are in place for a competent person to investigate all reported accidents, dangerous occurrences or work-related illness.
- Make sure that information on all accidents and dangerous occurrences is provided to workers.
- Make sure your workers know and understand the reporting systems you have put in place and what they need to do to cooperate so that the systems work properly.

- Keep records of every accident and dangerous occurrence and case of occupational ill-health and such records should be capable of being accessed or retrieved easily.
- Guarantee the confidentiality of personal medical information of employees.

Description of SAMRASS Forms for reporting Accidents and dangerous occurrences

Accident and dangerous occurrences report form (SAMRASS 1) must be completed for reportable accidents in terms of regulations 23.1 (a) and (d) and dangerous occurrences in terms of Regulations 23.4. Sections E and F should not be completed if a dangerous occurrence.

Forms SAMRASS 2, 3, 4,5,6,7, should be attached where applicable. Form 4 relates to 1-13day injuries, form 5 for reporting accidents involving explosives; form 6 – fires and form 7 substances in coal mines.

SECTION A

Employer's details such as Name of Mine, DME Mine Code and the main commodity being extracted.

SECTION B

Accident or Dangerous occurrence details

What should be included in Form 1?

The following information relating to the accident or dangerous occurrence should be included in this section of Form 1:

- The accident or dangerous occurrence number of the mine.
- The number of persons killed in the accident or the dangerous occurrence.
- The number of persons totally disabled.
- The number of persons injured.
- The date of accident or dangerous occurrence.
- The time of accident or dangerous occurrence.
- Where the accident or dangerous occurrence happened (its location).
- Name of the workplace where accident or dangerous occurrence happened.
- If underground, indicate the depth below surface in metres.
- Indicate the section of the mine.
- Provide a brief and clear description in words of the accident or dangerous occurrence.
- If an accident, indicate the accident classification code.
- If dangerous occurrence, indicate the dangerous occurrence code.
- Indicate whether the accident or dangerous occurrence happened during working time hours or overtime.
- Indicate whether the accident or dangerous occurrence happened at normal workplace.
- Give an indication of the average number of persons at work during the previous month.

SECTION C

Indicate the details of the responsible persons, for example Level 1, Level 2, Level 3 inspectors and the manager.

SECTION E

(Injury Form SAMRASS 2) should not be completed if a dangerous occurrence and should contain details relating to the employee, circumstances and nature of injury.

SECTION F

Details of the injury including, the task or activity being performed at the time of injury, nature of injury, body part injured, type of accident of the individual and number of lost days.

Form SAMRASS3: Reporting Rock-burst and fall of ground accidents

SECTION A

You are required to indicate: the details of the mine and the operations and methods, the date and cause of the accident as well as the depth in meters below surface where it occurred.

SECTION B

It should include details of the accident showing:

- A clear description of the location.
- Full description of the site including the quality of the excavation, the temporary, permanent and regional support systems as observed before and after the accident with comments on the supports and the effectiveness of their use.
- Description of the emergency instrumentation and their operation during the accident.
- The geological details.
- The dimensions and boundaries of fall of ground.
- The total size of the area affected by rock-burst showing the extent of damage.
- Indication of how the mine lay out may have contributed to the event occurring.

SECTION C

Details showing whether the disaster was related to any seismic activity or event

Why you need to investigate accidents and dangerous occurrences and work-related ill- health?

It is a requirement of Section 11 (5) of the MSHA that the employer must report and investigate any accident, serious illness and health threatening occurrences in consultation with the health and safety committee. This means that you should develop and put into practice a procedure for reporting and investigating accidents, dangerous occurrences and cases of work-related ill-health at the mine and regularly audit and review the procedure. The procedure will help you determine and assign clear responsibilities for investigating accidents and make sure that people working for you understand their roles in the process. The investigator should know the accident investigation process and techniques. There are important reasons why you must investigate an accident, dangerous occurrence or case of ill-health at work.

Investigating accidents, dangerous occurrences and cases of ill-health at the mine will:

- Help you comply with section 11(5) of the MSHA requiring you to report investigate accidents, dangerous occurrences and ill-health at the mine.
- Provide you with a good opportunity to assess whether you are complying with legal requirements such as training of employees to improve their competence, and maintenance of work equipment and machinery by deficiencies in work processes and equipment.
- Enable you identify immediate and root causes of the accident, dangerous occurrence or illness which will help determine corrective actions that will prevent similar or other accidents or incidents happening again.
- Reduce injury and worker compensation costs.
- By investigating an accident you are demonstrating the employer's clear commitment to the health and safety of your employees, showing that you care for their wellbeing and have apposite health and safety culture which they must follow. This will further improve health and safety culture at the mine, raise employees morale which can suffer badly if the accident were not investigated. They will feel good about their work.
- The evidence gathered during investigation can help you when settling civil liability issues or even criminal prosecution, for example if a visitor was injured during the event and is claiming compensation.
- Provide you useful information that will help you estimate the real costs of the accidents; establish accident trends for specific working places at the mine. This can serve as additional motivation to take corrective actions that will be recommended to prevent reoccurrence.
- Provide information that will help you identify the need to review your hazard identification, risk assessments, control measures and safe work procedures. For example, your HIRAs may have missed something or deficiencies identified in the investigation may show that many of your risk assessments are affected and will need to be reviewed.

It is important to bear in mind that an accident investigation programme at the mine requires the dedication, personal interest and commitment of senior management as well as understanding and support from the workers without which the programme will fail.

What are the consequences of accidents?

Accidents impose direct and indirect consequences affecting the employer and employees.

1. Direct consequences

- Personal injury to the employee.
- Property, equipment loss or damage to the environment, e.g. chemical release.

2. Indirect consequences

- Lost income.
- Medical expenses.
- Time and money to retrain another person to replace injured worker.
- Decrease in employees' morale that can reduce productivity.

Who should conduct accident investigations?

The responsibility of investigating an accident, dangerous occurrence or a case of ill health should be given to competent persons and section 11(5) (b) and (e) requires competent person be senior managers, line managers, supervisors occupational and health and safety professionals to consult with health and safety committee and the health and safety representative for workplace where the investigation is taking place.

How should the investigation be carried out and documented?

The aim of the investigation is to determine the immediate and root causes of the accident, develop the measures or actions to be taken to correct the situation, establish a concrete timetable for carrying out the measures and assign responsibilities for carrying out the corrective measures or actions.

There are five basic steps or stages that can be followed in the investigation of an accident, namely:

Step 1: Gather accident information (collect data)

Step 2: Analyse the accident information

Step 3: Identify control measures

Step 4: Formulate an action plan and put it into practice

Step 5: Document the investigation

Step 1: Gather accident information

At this stage you will concentrate efforts on collecting all the relevant information to establish what had happened including:

- Date, time, location of the accident, persons that might have been affected and witnesses; nature of injury or ill-health, plant and equipment involved; task being carried out; procedures in place for carrying out task.
- Information from visual inspection of the scene or location of the accident including taking photos if necessary, measurements and sketches, examination of videos or CCTV recordings.
- Interviewing the injured if possible, witnesses and other persons that may provide useful information. Interview victims and witnesses as soon as possible after the incident and make sure that medical care or first aid is not interrupted to conduct an interview. Interview each person separately and do not allow witnesses to consult each other before the interview. When interviewing witnesses, select a comfortable, private and quiet location. Set witnesses at ease by explaining that they are not the focus of the investigation but the situation; try to ask for ideas from them on how to prevent such an event happening again. If possible, show them diagrams and drawings and remain neutral throughout the interview. Take notes and keep a record of the discussions or facts and make sure you review the statements before you end the interview.
- Examining records e.g. records of risk assessments and control measures, safe work procedures, monitoring level, records of previous accidents or ill health, Equipment supplier information, level of supervision, training records and production pressures. Some of these sources may help you identify the immediate causes, others the root causes of the accident.

Step 2: Analysing the accident information

You will need to analyse the information gathered in order to identify the immediate and root causes of the accident, dangerous occurrence or ill-health. For example, the direct or immediate cause of an operator amputating his finger was because it got caught in rotating blade of hand tool. The indirect cause may have been improper use of equipment due to lack of or inadequate/poor training (root cause) or the absence of a guard (indirect cause) and poor maintenance (root cause), etc. This involves the use of suitable root cause analysis techniques and should be carried out by a competent person versed with these techniques. In analysing the facts, you'll need to answer the following questions relating to the incident:

- Who?
- What?
- Why?
- When?
- Where?
- How?

Who?

- Who was injured?
- Who was working with him/her?
- Who else witnessed the accident?
- Who else was involved in the accident?
- Who is the employee's immediate supervisor?
- Who rendered first aid or medical treatment?

What?

- What was the injured employee's explanation?
- What were they doing at the time of the accident?
- What was the position at the time of the accident?
- What is the exact nature of the injury?
- What operation was being performed?
- What materials were being used?
- What safe-work procedures were provided?

When?

- When did the accident occur?
- When did the employee start his/her shift?
- When did the employee begin employment?
- When was job-specific training received?
- When did the supervisor last visit the job?

Why?

- Why did the accident occur?
- Why did the employee do what he/she did?
- Why did co-workers do what they did?
- Why did conditions come together at that moment?
- Why was the employee in the specific position?
- Why were the specific tool/equipment selected?

Where?

- Where did the accident occur?
- Where was the employee positioned?
- Where were eyewitnesses positioned?
- Where was the supervisor at the time?
- Where was first aid initially given?

How?

- How did the accident occur?
- How many hours had the employee worked?
- How did the employee get injured (specifically)?
- How could the injury have been avoided?
- How could witnesses have prevented it?
- How could witnesses have better helped?
- How could the accident have been prevented?

Step 3: Identify control measures

Having identified the immediate and the root causes of the accident at the analysis stage, the investigation will use these to determine appropriate control measures that would prevent similar incidents happening again. In formulating control measures, you must use the hierarchy of controls to comply with Section 11 (2) of the MSHA as follows:

- Eliminate or control at source
- Engineering control measures
- Administrative control measures
- Application of safe work practices; training
- Personal protective equipment

Step 4: Develop an action plan and put it in practice

The action plan should show:

- How and by whom the plan will be implemented or put in practice.
- Clearly sets out the objectives to be achieved that are specific, measurable, agreed through consultation, realistic and a time schedule for completion is set for each of them
- Clearly identifies the persons responsible for implementing the action plan
- That it has been developed in consultation with senior management, supervisor, health and safety committee and health and safety representatives or workers.
- A record of progress being made during implementation.
- The action plan is monitored and reviewed to make sure that it is improved on an on-going basis.

Step 5: Documentation

- Complete an accident investigation form as show above to collect:
 - Personnel information.
 - Accident information (location, events leading to accident, machines involved).

- Causes of the accident.
- Recommendation to prevent accident.
- Follow up information.
- From the accident investigation form and witness statements write an accident investigation report. The report should include:
 - Background information (where, who).
 - Summary (sequence, extent, type, source).
 - Analysis (causes).
 - Recommendations.

Follow-up on corrective action implementation

Lack of competent follow up is the greatest deficiency in accident investigation. You must check whether the action plan following the investigation is being implemented and confirm when completed. Review your measures as needed.

6.13 Guidelines for the management of contractors

Who is a contractor?

You may have specific jobs which are either particularly high-risk or you cannot maintain permanent staff to do them when the need arises including maintenance, repair, and installation of plant, construction and excavation work. Any person you hire to carry out a job and who is not your employee is a contractor. This means that it is possible for you to have several contractors working at the mine. Whether the contract is large or small, you must pay particular attention to the risks of the job to workers at the mine including contractors, their staff and other persons and how they are to be controlled.

What the law says about contractors working on site?

Section 5 (2) of the MHSa states that the owner of the mine or employer must identify hazards and assess risk to employees and ensure that persons who are not employees but may be affected by the activities of the mined, are not exposed to any risks to their health and safety. This category of persons includes visitors, contractors and their staff, members of nearby business, neighbouring mines or sites and communities.

This means that as the owner of a mine or employer, you are not only responsible for health and safety of workers you have employed directly as required by sections 2(1) and (2) of the MHSa, but you must protect the health and safety of all persons present or working on site either temporarily for only a short time or longer period of time, including contractors, and their workers or staff.

Why manage contractors?

Studies show evidence of several accidents occurring with contractors working on site that are traced back to them. Accidents may occur rarely but when one occurs, it may be extremely expensive, could bring down your business due to the losses in production and time, key workers, plant, machinery and equipment, compensation costs and legal penalties and increases insurance and civil law claims. You may take several years to recover. Hence you must have a robust system of selecting and managing your contractors. Before giving the contractor your job, you need to be satisfied that the contractor you select will be able to do the work and has the right procedures to do the work safely and without risk to other persons.

What are the duties of the employer in relation to the contractor?

An employer you cannot sign a contract passing on to someone else your duty under the MHSa to ensure the health and safety of the people working for you at the mine including full time or part time employees and contractors and their staff. If you hire the services of a contractor, for example, to carry out excavation work on site, you have the following duties toward the contractor:

- You must conduct a risk assessment of the task, develop and communicate a safety programme of the task to the contractor.
- Give the contractor full details of your health and safety programme and rules and list of potential site hazards.
- Make sure that the contractor's health and safety obligations during the work are written out in the contract agreement.
- Assess the contractor's health and safety plan for the task and agree the specific health and safety procedures that will be followed to do the work safely.
- Provide clear information to the contractor on hazards on site including hazardous materials stored on site that the contractor or staff may come into contact with.
- Appoint a coordinator or project manager who will coordinate activities with the contractor including compliance with on-site health and safety rules and procedures. The health and safety coordinator will provide safety orientation and visit the work site every day to check whether all procedures are being followed as planned and work is progressing safely. Remember the inspection of mines can pay you a visit to inspect your mine and ask to check the arrangement you have put in place to manage contractors working at the mine.

What are the duties of contractors?

The contractor who accepts to undertake work at the mine has the following duties:

- Comply with MHSa as an employer.
- Carrying out a risk assessment of the work, obtaining a copy of the employer's health and safety plan for the work and developing and reviewing the contractor health and safety plan for the job.
- Providing to the employer the health and safety policy and plan stating when these will be evaluated and reviewed.
- Formulating and providing the employer details of how specific safety procedures will be followed.
- Providing a list of rules contractor workers will follow when carrying out the work.
- Showing documentary proof that contractor workers have received proper training in the job and the safe work procedures. As the employer, you can ensure contractor workers are fit for work at the mine by requesting evidence of their training and fitness. However you must provide them induction training before they gain access to their work area and start work.

Information you need to provide your contractors

New contractors are strangers to your site and need clear information from you about:

- The hazards on site.
- Site rules and safety procedures.
- The PPE they need to wear.

- Special equipment, which they will need to use.
- Emergency arrangements and what to do in event of an emergency – basics such as the sound of the alarm, when and how to raise alarm.

Managing Contractors

Arrangements you need to put in place to control contractors

You need to put in place arrangements that will control the work of the contractors you hire in order to minimise or reduce risk to your employees and other persons at the mine:

- The contract arrangement should include a specific risk assessment of the work to be carried out.
- There should be a clear agreement on work schedules and time scales that are communicated to and understood by all employees, contractor and staff.
- Arrangement to provide induction health and Safety training to contractor and staff before admissions to the site so that they understand your health and safety rules and procedures and the implication of their work on the mine.
- Provide contractor with adequate information on the hazards to be expected at the working place where work will be performed and the control measures in place.
- Arrangement for the delivery and storage of the contractor's material and equipment to the working place without interference with access / egress of workers and emergency escape ways
- Appoint a coordinator to manage contractor, communicate arrangements to contractor and personnel.
- Plan safety meetings in advance between your coordinator and the contractor contact person to determine progress being made, for example whether work is being done as agreed and site procedures are being followed.
- Communicate site rules and strict instructions to follow them to employees, contractor and staff, for example site rules relating to restricted areas of mine workers and contractors; strict housekeeping instructions to remove and safely dispose of wastes that may be a danger to mine workers.
- Adequate instruction on site accidents, dangerous occurrences and ill-health reporting procedures so that in the event that an accident happens involving a mine worker, the manager on charge of the project is informed without delay.
- Put in place strict security procedures that include signing an signing out logs.
- Communicate how the means of escape must be maintained to ensure the safety of mine works and the emergency procedure that will be followed if an emergency happened.
- Procedure on how risk assessments and method statements or safety systems of work will be reviewed as the contract work progresses.
- Arrangements for checking performance as work progresses and evaluating the completion and hand over of the job.
- A procedure to review overall health and safety performance after work has been completed and handed over.

The Health and Safety Executive of the United Kingdom recommends 5 simple steps for managing contractors on site:

Step 1: Planning

In the planning stage you determine the work you need to be carried out, for example maintenance or repair work on a drilling rig; identify the hazards of the job, assess the risks

and as far as reasonably practicable try first to eliminate them, and if not possible control at source or reduce them; specify to the contractor the health and safety conditions they need to meet and discuss with contractor that is selected.

Step 2: Selecting a contractor

Even if the job is small do not try to do it yourself or select a less competent person to do it so that you can spend less money. Check the technical competence of the contractor, their reliability and whether they have method statement or safe work procedure for the task. Careful checking can be decisive in determining whether you get the wrong contractor. For example, the contractor can appear technically competent but you may find out in the contractor's accident history that the last time they were on site, they had an accident. They may be less reliable than presented in the application, for example, you may check and find that the last time they did such a job, they sent different workers each day.

You need to check whether the contractor has taken time to know the hazards and controls on site, and make sure you set down your own rules relating to subcontracting in case your contractor may wish to subcontract parts of the work. Remember, subcontractors will bring along further health and safety problems which you must make sure your contractor is committed to managing. Ask questions: what will you do with a contractor that says they have training records and safe method statements and cannot show these?

What you need to consider when assessing contractors before hire

- Consider the experience of the contractor with the type of work to be performed at the mine. Find out from reference, contacts in the business and line managers or supervisors, and Health and Safety Committee. This will also help you establish reputation of the contractor with previous and current clients.
- Look at the quality of the Health and Safety Policy and program and the risk assessment, more especially their risk assessment on the work to be undertaken and the method statement or safe system of work that the contractor proposes to use.
- Consider the level of training and competence of the contractors' staff: are they using skilled, semi –skilled or unskilled artisans that will require longer period of training and closer supervision?
- Examine records of the contractor's Health and Safety performance including their accident history, enforcement orders from Mine Health and Safety Inspectorate, etc.
- Examine their machinery and equipment inspection and maintenance records
- Look at their insurance details and premiums
- Consider evidence of membership in professional organisation
- Table 12 below shows questions you need to put to a contractor you intend to hire.

Table 12: Questions to ask your contractor

Contractor's experience	Contractor's health and safety policy practice	Contractor training and competency	Supervision
1. What experience do you have of working in mine?	1. Do you have a health and safety policy?	1. Are you a member of a trade/professional body?	1. How do you plan to supervise this job?
2. How familiar are you with hazards in mines?	2. Has DOL / MHSI taken action against any of your activities?	2. How do you make sure your subcontractors are competent?	2. Who will be responsible for supervision on the site?
3. Have you done this job before and what are its main problems?	3. What are your health and safety procedures?	3. How do you prepare them for working safely while on site?	3. How are changes which arise during the job dealt with?
4. Can you provide existing risk assessment or safety method statement for a similar job?	4. Do you plan to use any subcontractor?	4. What health and safety training do you provide?	4. How will you liaise with us?
5. Can you provide references?	5. Will they provide a safety statement for this job?	5. How is information about safety passed on to staff and subcontractors?	5. If you identify a problem, what action do you take concerning your staff or subcontractors?
	6. What safety checks do you make for equipment & materials?	6. Can you show us your training programme?	6. Will you report accidents/incidents to us?
		7. Have you got current certificates of competence and participation in health and safety training?	7. Are you prepared to abide by our rules?

(Adapted from HSE 2011)

Step 3: Manage contractors working on site

- Adopt strict security measures, for example, by making sure that all contractors and staff sign in and out of the site.
- Name a site contact person who has sufficient authority and competence, possibly a manager who contractors can contact regularly especially if there are changes in the job or the contractor becomes uncertain about what to do. The site contact coordinates activities with the contractor, checks the precautions in place e.g. whether any specific safety system of work such as a permit to work is required, agree on supervisor arrangements and time schedule for the job to be completed.

- Provide the contractor all necessary information including hazards, risks and controls, site rules, emergency procedures, location of fire-fighting equipment, first aid and alarm facilities.
- Discuss the job with them, going through all safe methods of work presented before clearing work to begin.

Step 4: Checking or monitoring the work

This is the critical stage in managing contractor work at the mine. At this stage you check what is being done, whether the work is proceeding as you planned and whether there are problems that need to be discussed and sorted out. You need to check the following:

How the job is going:

- Is the job going as planned according to specifications?
- Is work being done safely as agreed? E.g. following the safe work procedures?
- Have there been any incidents?
- Have there been any changes in contractor personnel?
- Are additional arrangements required?

Step 5: Reviewing the work

It is important to review the job since you can only determine that the job is complete if it was done according to the specifications agreed. When you review a job, you assess the quality of the job against the agreed specifications of the job as well as the contractor's performance. This is the only way you can identify what you need to do differently next time to improve performance- you learn lessons from the current job by keeping all the records and making reference to them next time you allocate work to contractors.

What you need to review?

You need to review all the other steps in managing the work of a contractor including:

- Planning for contract work.
- Selecting the contractor.
- The contract work.
- Effectiveness of contact person or coordinator and the supervision.

6.14 Guidelines for health and safety training at work

Training and education is a means by which employee learns a safe and healthy approach to his/her work. To ensure a safe and healthy work environment at the mine, workers must know the health and safety rules in place and how and when to function under those rules. Health and safety training enables the people who work for you to understand and put into practice the principles of good health and safety behaviour and prevention of accidents, dangerous occurrences and ill-health at work.

What the MHSA says about health and safety training?

Sections 10 (1), (2) and (3) of the MHSA requires the owner of a mine or employer to provide as far as is reasonably practicable information, instruction, training or supervision to employees to enable them to work safely and without risk to their health and that of others. You must make sure that people working for you are aware of the hazards and risks of their work and the measures you have put in place to eliminate, control or reduce them. This

means that you must provide adequate training to your workers so that they understand the hazards and risks of their work and how to deal with them. You need to train them in the procedures they must follow to do their work and in the event that an emergency situation happens at the mine.

You should put in place a training policy that is continually improved. The policy should allow you to:

- Decide whether training is needed (who requires training?).
- Identify training needs at the mine.
- Formulate training objectives and develop training methods.
- Develop training programme and conduct training.
- Evaluate effectiveness of training and review the training programme in order to improve the entire training process at the mine.

1. Decide whether training is necessary at the mine

You must consider what the law requires you to do. Look at Section 10 of the MHSA, which states that you should provide instruction, information, training and supervision to people working for you. Health and safety training is a continuous or on-going process and therefore is a persistent requirement. For example:

- Health and safety induction or orientation training will be necessary whenever you recruit a new employee and before he or she starts work at the mine.
- If you buy new equipment or new materials such as chemicals for use at the mine you will need to conduct new risk assessments, put in place control measures and train workers in the hazards, risks and how to apply the measures.
- If you move an employee to a new or different job, that employee will require training to do that job safely without risk to health.
- If new Health and safety regulations and standards for the mines have been passed, for example the Mine Health and Safety Inspectorate has introduced a new guideline to compile a mandatory code of practice, you must comply and train your workers to put into practice the code of practice.
- Whenever any accident, dangerous occurrence or case of ill-health happens at the mine, you will need to review your risk assessments and control measures, safe systems of work including training programmes which may require refresher or remedial training.

When making decisions regarding health and safety training, think about costs, how much money you can allocate to training, especially if you are a small mine operator and your resources are limited. Consider the best way of obtaining greater benefits from putting your resources into training. It may be a good idea to send one or two employees to a health and safety course including a trainer course and set up a training programme for the trainer to train your employees. In the interim, you can decide whether to invite a trainer to the mine to provide training to your workers or a selected group including health and safety representatives and members of the health and safety committee.

2. Plan for training and identify training needs at the mine

The best practice in the provision of health and safety training to the people who work for you is proper planning as well conducting an assessment of training needs.

2.1 Proper planning

Proper planning means putting together the team to conduct the assessment; gathering and considering the requirements of MHSA and regulations and relevant DME guidelines; talking to employees and their representatives about how the work is done and health and safety concerns; consulting the health and safety committee; considering the record of significant hazards, assessment of their risks and control measures; consulting job specific accident, dangerous occurrence records to see what caused losses of control, how these can be prevented through additional training.

2.2 Assessing your training needs

Assessing your training needs of people working at your mine will enable you provide them the right type of training they need to do the job. This means that your training will correspond with the job and also keep pace with changing needs at the mine. A training needs assessment is a systematic or step-by-step process that requires you to:

- Assess training needs in relation to the general organisational arrangements at the mine including the need to train workers about the mine's general health and safety policy and the health and safety plan or programme for putting the policy into practice. Employees need to know parts of the health and safety management system that concern them, and are entitled to understand major hazards and risks of the activities at the mine and how they are controlled.
- Assess the work environment: you will need to examine work environment issues such as weather, and temperature extremes, exposure to harmful dusts and gases, noise, etc. and relate these to the activities that people working for you are expected to carry out.
- Assess the way jobs are organised at the mine: you need to look at the way you recruit and select your workers and their competence and suitability for the job; check the job descriptions or specifications to identify the health and safety aspects of each job; check the type of the equipment and tools needed to do the job and the way they are selected; look at the work procedures, particularly the way they are developed and managed.
- Assess the job: this requires close observation of the work being done to identify all the tasks, equipment, materials, work process and related hazards and controls. It is a good idea to think about ways in which the jobs may change in future and how such changes are likely to affect the health and safety of the people who work for you.

2.3 Determine the gaps for training as follows:

- (a) The above assessments should enable you identify the knowledge, skills and specific attitudes your employees need to prevent accidents and ill health while performing their jobs.
- (b) Proceed to assess and identify the health and safety competencies that people at the mine already have.
- (c) Compare the existing competences (b) to those your employees need (a) to work safely and prevent accidents and work-related ill-health.
- (d) Identify the gaps that will be eliminated or reduced by preparing and delivering health and safety training. These are your training needs – the outcome of the training needs assessment.
- (e) Plan, develop and schedule the training programme and deliver the training to the employees targeted.

- | |
|---|
| (f) Monitor the implementation of the training programme, and set a time scale to assess whether training was effective and review accordingly. |
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2.4 Develop training objectives and training methods

Remember in your hazard identification and risk assessment process, you used the risk ranking to prioritize those you needed to address first. You will need to use your job analysis and risk assessment to prioritize your training needs and then formulate your training objectives, training content and methods to deliver training to meet the objectives. This way you provide a basis for measuring or checking after training whether workers are performing according to the level you intended or their training needs have been met.

2.5 Conduct the training programme

- Schedule training in an overall training matrix for the mine
- Determine the cost and the level of expertise required, for example whether you will need to hire the services of a professional trainer
- Remember that Section 24 of MHSa states that employees shall not be made to pay for their training. The employer is solely responsible for training employees.

2.6 Evaluate whether training is effective

You identified a gap in the health and safety knowledge and skills of your employees which made up their training need. After training and some period of work, you need to assess or check whether the training provided effectively closed the gap. The first indication of the effectiveness of the training programme will be the study feedback obtained from the trainees at the end of training. You will need to conduct a more detailed assessment, for example six months after training using questionnaire and tracking of accident and incident history to obtain an estimate of the effectiveness of the training programme.

2.7 Maintain a record of training

You should monitor training by recording and tracking who has been trained and in what. Individual records should be kept in training register for all training activities showing the following details:

- Date and time of training.
- Location of training.
- Subject of training.
- Contents of training.
- Length of training details of trainers and their expertise.
- List of trainees.
- Results of tests done by trainees, if any.

3. Training managers and supervisors

Not only employees need training: management and supervisory staff also require health and safety training. Managers and supervisors have specific health and safety training needs.

3.1 Training needs of managers include:

- Leadership and communication skills.
- Health and safety principles.

- Techniques of health and safety management including training, instruction, coaching and problem solving skills.
- Know of health and safety legislation and standards, for example MHSA and Regulations, SABS Standards, DME/DMR guidelines.
- Knowledge of the organisations planning, monitoring and auditing arrangements.
- Hazard identification, risk assessment and control.
- Health and safety record keeping or documentation.
- Handling emergency situations.

Managers in key positions may have particular training needs, for example those who take part in developing the health and safety management system, investigate accidents, dangerous occurrences and cases of ill health and carry out auditing activities will need to be trained to carry out these functions.

3.2 Training needs of supervisors

Supervisors are assigned health and safety roles and therefore should undergo training to be able to:

- Conduct health and safety inspections.
- Identify hazards, assess their risks and determine controls.
- Investigate accidents, dangerous occurrences and cases of ill health and write out reports.
- Communicate and consult effectively.
- Conduct on the job training effectively.
- Instruct and coach employees to understand procedures at the mine.
- Assist the employer to comply with the MHSA requirements and provisions of other applicable legislation, standards and guidelines.
- Handle emergencies.
- Maintain proper health and safety records.

4. Requirements to be considered for conducting a healthy and safety training programme

When developing a training programme for the mine, you need to consider the following general requirements:

- 4.1 Develop and put into practice a formal training matrix or scheme showing training tasks and expected outcomes, for example:
- Induction training for starters.
 - Additional training for workers who move to new jobs.

It is good practice to train and employ staff to work on the surface before they proceed to work underground; and to provide close supervision to starters while on training especially when they are carrying out new tasks or are working underground.

- 4.2 Keep individual training records to meet the MHSA requirement to keep training records as well as to keep track of all training you have provided so that you are able to assess the effectiveness of training and whether your expenditure is justified.
- 4.3 Provide refresher training as part of the overall mine training programme and integrate briefing sessions in the programme to update everyone at the mine on any changes in work process, machinery and equipment, operating procedures and work environment.

4.4 Review the mine training matrix regularly

5. Types of health and safety training

The type of training you provide to your employees depends on the following important aspects:

- The employee's role and responsibility.
- The job to be undertaken, for example the operator of a drilling rig or trackless mobile machine will require specific training.
- The hazards of the job.
- The type and frequency of occurrence of work place injuries and ill-health relating to the type of job.

In this regard training may be formal requiring a long or short course at an institution with a certificate as the outcome or informal provided by an experienced supervisor or worker having skills in health and safety. The more specific types of workplace health and safety training will include the following:

- New employees require health and safety orientation training before they start work or are exposed to the work environment.
- Individual job training is provided to every employee and the content of such training includes: Regulations and standards that apply to the job; how to recognize, prevent or minimise unsafe conditions that may arise when performing the job; Areas and activities of the job that require PPE and how to wear, use, store and maintain PPE.
- On-going health and safety training is provided to all employees on: new procedures, new equipment or plant, new materials such as chemicals, refresher / remedial training.
- Specific training to be given to employees includes: fire extinguisher training, confined space entry, respirator care and use, hazard investigation, risk assessment and control, isolation procedures (lock out and tag out procedures), lifting equipment operation, electrical work, etc.

5.1 Induction training

Why induction training is needed

Transferred or new employees recruited at the mine are inexperienced and must be given induction training before access to workplace to start work. Studies show that inexperienced workers are generally involved in more accidents than other workers. New workers will need time to gain experience in their job but induction training at the onset that provides them knowledge and skills can help reduce accident rates among them.

Contents of typical induction training:

- The nature of the hazards of their work.
- How to identify and report hazards.
- Consultation arrangements of the mine e.g. the role and functions of health and safety representatives and health and safety committee.
- The general health and safety policy.
- Duties of employees under MHSa.
- Health and safety procedures applying to their specific working places.

- General safety rules relating to hearing protection, electrical safety and lockout procedures, emergency procedures and escape routes and assembly points.
- Disciplinary procedures, reporting accidents and dangerous occurrences.
- Manual handling techniques including lifting.
- Work equipment safety.

You should also make sure that during induction training, new workers:

- Take a guided tour of their working area.
- Receive an instruction on the amenities available (restrooms, change rooms, canteen, clinic, etc).
- Are introduced to colleagues & health and safety representatives.
- Receive a description of general workplace hazards and the controls in place.
- Receive a description of the location of fire-fighting and first Aid equipment.
- Instruction on emergency escape routes and exits.
- How to obtain PPE if required.

5.2 On the job training

This is part of or the continuation of the induction training and its purpose is to make sure that the people you employ understand their roles and what is expected of them. When conducting on the job training, the supervisor will need to consider whether the employee has previous experience in the job and where necessary demonstrate the main aspects; identify potential hazards of the job, describe the measures to control the risks and demonstrate how to apply the safe operating procedures. It is important to be practical at this stage by watching the employee perform the job and make corrections if needed. The employee can be tested by asking him /her to describe the potential hazards of the job and the control measures. All the steps should be repeated until the employee demonstrates a clear understanding of the health and safety aspects of the job.

5.3 First Aid training

Instruct your employees so they know the first aid facilities and procedures at the mine. You are required to train sufficient number of first aiders to be able to provide adequate assistance during an emergency

6. Who needs health and safety training at the mine?

The MSHA states that everybody at work has shared responsibility for health and safety at work. This means everyone at the mine will require some training in health and safety including:

- The employer.
- The supervisor.
- All employees including part time, full time or casual.
- Health and safety representatives.
- Members of health and safety committee.
- Contractors and their staff working at the mine.
- Students on internship to gain work experience.
- Visitors.

6.15 Guidelines for complying with the requirements for fitness to work and welfare facilities

Mine work is physically demanding and strenuous. Workers must cope with strenuous physical tasks such as digging and drilling and a hostile work environment often involving shift work, long hours of highly repetitive work that can lead to fatigue and in turn cause accidents. Fitness to perform work in a South African mine is therefore a statutory requirement. Fitness for work is a worker's capacity to work without risk to their health and safety and that of others. A fit worker improves productivity and is better prepared to maintain good health and safety in the mining workplace because he/she is better able to withstand job pressures and avoid accidents. Prospective employees to mines need to be assessed to make sure that their physiological and psychological capacity matches the jobs they are being employed to carry out. Existing employees must be monitored to make sure they stay fit for work and the injured and medically affected category of employees must also be assessed for fitness so that modifications can be made to their current jobs or they can be moved to alternative jobs or tasks at the mine.

What the law says about fitness for work at a mine?

As the owner of a mine or employer, it is a good idea to always refer to your duty under Section 2 of MSHA which states that it is your responsibility to do all that is reasonably practicable to make sure that your employees work safely without risk to their health and that of others at the mine. In addition section 13 of MSHA states that an employer must establish a system of medical surveillance for employees consisting of initial medical examination to determine their capacity to perform the job at the mine and other medical examinations at the appropriate intervals to monitor and maintain their health and fitness to continue work as well as level of fitness to exit.

Pre-employment medical checks to determine fitness to work

Pre-employment medical examination is intended to place and maintain employees in a work environment that is adapted or suited to their physical and mental capabilities. The aim of the examination is to determine whether an individual is fit enough to carry out his job without risk to himself or others. Scientific studies show that workers with alcohol and substance abuse have significantly higher rates of disability, and this is made worse if they have chronic physical illness.

When deciding on fitness for work, the occupational medicine practitioner must consider:

- The specific job the employee will be carrying out and the health hazards that have been identified in relation to that specific job.
- The nature of the duties, which the employee will have to carry out.
- The age and experience of the employee.
- Present and past medical conditions of the employee.

In matters relating to fitness of employees to perform work at a mine, you may need to prepare a mandatory code of practice on fitness to perform work at the mine as required by DME Guideline on compilation of a mandatory code of practice on minimum standards of fitness to perform work at a mine. This will help you comply with section 9(2) of the MSHA which requires you to prepare and put in practice a code of practice on any matter that affects the health and safety of employees and other persons who may be directly affected by the activities at the mine if the chief Inspector of mines requires it.

The MSHA requires you to protect the health and safety of all people working for you; in particular, you must ensure that:

- Each employee is fit to perform his or her work at the mine.
- That the health of an employee certified as fit to perform a specific job is such that the employee will be able to do the work without risk to the health and safety of the employee and others.
- Establish a baseline of each employee's health against which subsequent changes in the health status of the employee will be measured by the occupational medical practitioner to determine his continued fitness for work.

What types of medical examinations are needed to assess fitness for work?

The occupational medical practitioner can conduct initial and periodic medical examinations to assess fitness for work of employees.

1. Initial or pre-employment medical examination

Generally pre-employment medical examination for a job is justified when:

- Required by law.
- Working in hostile hazardous environments.
- The job requires high standards of fitness.
- The safety of other workers or the public is a concern.

An applicant for a mining job must pass a pre-employment or initial medical examination before confirmation of the job offer and the new employee starts work. The examination including baseline tests should take into consideration the health hazards of the specific job and the results of relevant risk assessments. For example, it will be good practice for the occupational medical practitioner to consider fatigue related issues of the risk assessments for physically demanding tasks including how work rosters have been designed: night shifts and shift lengths; breaks during shifts, start and end times and rest periods between shifts; whether the job is repetitive or monotonous, is fast paced or requires sustained physical and mental effort; the environmental factors such as noise, air pollution, vibration, extreme temperatures and radiation. The occupational medical practitioner will also check other fatigue-related factors such as sleep disorders, substances that can cause drowsiness or prevent sleep.

Pre-employment or initial medical examination will require a prospective or new employee to complete a questionnaire about the candidate's general medical history including family history and undergo a physical examination.

- a) The questionnaire will find out the following information from the prospective employee:
- Whether currently taking prescribed medication
 - Smoking habit
 - Alcohol and drug habit
 - Family history of vital health issues such as heart disease, diabetes
 - Candidate's current health issues e.g. history of asthma
 - Details of recent surgery
 - Information about recent medical consultations

b) Physical fitness test will check the following:

- Test sight
- Test hearing
- Lung function tests
- Find body mass index
- Test urine
- Measure blood pressure
- Test for physical fitness (cardio fitness, physical strength assessment)
- If necessary X-rays & ECG

2. Periodic medical examination

Serving employees should be periodically examined at appropriate intervals and in making decision on the content of the examination and the frequency the occupational medical practitioner should be guide by:

- The hazards the individual employee is exposed to.
- The physical requirements of the specific job.
- The results of any relevant risk assessment recorded.

Outcomes of the initial medical examinations

If the standards for determining or assessing for fitness for work have been met, there are only two outcomes or results namely the employee is:

- Fit for usual work category of work.
- Unfit for usual category of work.

Outcomes of periodic medical examination

If the standards for determining or assessing for fitness for work have been met, the employee may be either:

- Fit for usual work category of work and certificate issued.
- Unfit for usual category of work and certificate issued.

These outcomes are the same as for initial medical examination but in this instance, the occupational medical practitioner has a discretion to consider the effects any illness or impairment, if found, will have on the ability of the employee to continue work without endangering the life of that employee or others. The experience of the employee should be taken into consideration, as experienced employees in certain jobs tend to do the work safely without risk to fellow workers and could thus compensate for any impairment. In all cases, the guiding principle is to protect the employee from further deterioration in health or impairment at work, thereby reducing risk to others.

Guidelines on workplace alcohol and drug abuse

Alcohol and drug use affects fitness for work. People working at the mine and visitors under the influence of alcohol or other drugs may injure themselves or other employees or persons present at the mine. If alcohol and drug abuse are a problem on site, the owner of the mine or employer is responsible for taking action to maintain a healthy and safe work environment. As the employer, your responsibility is to identify employees with alcohol or drug problem, encourage and provide them access to treatment and counselling and at the

same time put in place in consultation with health and safety committee a substance abuse policy to control alcohol and drug abuse at the mine.

What the law says?

Section 2 of the MHSA states that the owner of the mine or employer must maintain a working environment that is safe without risk to health of employees and other persons that may be affected by the activities at the mine. This includes taking steps to prevent and deal with alcohol and drug abuse at the mine. Section 22 of the MHSA also requires every employee to take reasonable care to protect his/her own health and safety and that of others. This includes the employee making sure he/she is not in a state of intoxication or state that can make him / her incapable of caring for himself/herself or others in his or her charge.

Small mine operators may not have sufficient resources to develop and put in place a robust substance abuse programme but are encouraged to develop and implement a substance abuse policy on site to comply with the requirements of the MHSA.

A substance abuse policy should include:

- 1) Definition of illegal substance or drug, for example that “illegal substance” is any substance or drug which is:
 - i. Not legally obtainable e.g. dagga, ecstasy, cocaine, Tik, Khat (*Catha edulis*), Nyaope or
 - ii. Is legally obtainable but was not legally obtained e.g. prescription drugs or
 - iii. Was legally obtained but is improperly or unlawfully used e.g. petrol, thinners, and acetone which can be inhaled, or alcohol)
- 2) Prohibition of coming to work under influence of alcohol or drug (impaired, working impaired, bringing illegal or banned substances or drugs to the site, consuming alcohol or drugs while a work).
- 3) Requirement for testing for illegal substances.
- 4) Who to approach on site for assistance with alcohol or drug problem and the nature of the assistance that can be obtained. Remember that the policy is not to condemn employees but to support those who need help. Depending on the extent of substance abuse problem on site, you may need to put in place an employee assistance programme to provide counselling to employees and their families and where needed treatment, rehabilitation and return to work.
- 5) Disciplinary measures for employees who break the site substance and drug abuse rules, and the procedure to be followed if an illegal drug or substance is found on the employee.
- 6) Awareness training consisting of discussions during toolbox talks, special assemblies or workshops on elements of the policy including the effects of substance or drug use on employee health and safety and work performance; methods of identifying employees with substance or drug problem and how to manage employees under the influence.

Guidelines on welfare facilities for employees

What the law says about the provision of welfare facilities in the mine?

Section 2 (1) (a)(1) of the MSHA states that the owner of a mine or the employer must provide conditions of safe operation and a healthy environment that allows workers to carry out work without risk to health and safety. This includes the provision of a workplace layout, lighting and ventilation and welfare facilities with proper sanitation. All workers should be given access to adequate facilities including toilets, drinking water, washing and eating facilities, change rooms and storage lockers. Arrangements must be put in place to keep all welfare facilities in good working order, clean and easily accessible by all employees.

Section 22 of the MSHA states that workers have the duty to take reasonable care of their own health and safety and that of others persons. This means that they must comply with the employers reasonable instructions and cooperate with reasonable policies, procedures and programmes relating to health and safety on site including the use and maintenance in good sanitary order of welfare facilities provided for their use.

Employees need to be satisfied with their working conditions to work well and keep their job longer at the mine. Proper welfare facilities improve physical and psychological health of employees, making them to be more efficient and productive. Providing good facilities at the mine is an indication the employer is serious and committed to the wellbeing of employees.

Things to consider when deciding on providing and maintaining welfare facilities at the mine

1) When deciding to install facilities at the mine or improve existing or, you should consider the following items:

- The kind of operation at the mine.
- The nature of the hazards as shown in your hazard identification and risk assessment process.
- Size, nature and location of the mine.
- The number of workers and whether they include both males and females: this will help you determine whether you will need to provide separate toilet, washing facilities and change rooms for female and male workers.
- Consult the health and safety representatives and health and safety committee.

2) Make sure that all workers are able to gain access to facilities

Facilities should be as close to the working place as possible and such that all workers including those with special needs or disability can gain access to them. It is important that workers are given ample opportunities to use welfare facilities, for example, providing breaks, locating facilities close to working place, ensuring that means of access is safe at all times including during the night/day shifts.

3) Provide drinking water

You must provide your workers with sufficient cold and free drinking water. Water should be located where workers can easily reach it, for example close enough where workers may be experiencing excessive heat or where work is very physical e.g. digging and drilling. In these conditions workers can dehydrate or suffer heat stress and drinking water in sufficient quantities will reduce the risk. Drinking water should be located separately away from toilets or washing facilities to prevent contamination of the drinking water.

Drinking water will need to be supplied in such a way that proper hygiene is maintained when being used, in particular, by preventing workers from drinking directly from shared containers. For example, a drinking fountain, which delivers water via upward-facing jets, can be installed or simple system with sufficient supply of disposable containers or those that can be washed and reused.

4) Provide clean toilet facilities

Clean and accessible toilet facilities must be provided for all workers at the mine. Where female and male workers are employed, separate toilets should be provided. Make sure that there are enough toilets for the number of workers who may need to use them at the same time. Each toilet should be supplied with sufficient toilet paper, hand-washing facility with soap e.g. wash basin, rubbish bins, container for female workers to dispose sanitary items.

5) Supply hand washing facilities

Hand washing facilities should be supplied to work areas, eating areas, and toilets and should provide both hot and cold water with soap and hand drying facility such as an automatic dryer or paper towels.

6) Provide dining facilities

Dining room should be provided where workers can eat their meals. The dining room must be protected from weather, located at a reasonable distance from toilets, work process, hazards such as noise, heat, dusts and fumes. A sufficient number of tables and seats should be provided for workers wishing to use the facility.

7) Provide change rooms and personal storage facilities

If workers will need to wear PPE while they are working or leave work clothing at the workplace, you should provide private changing areas with secure storage for personal belongings. Change rooms should be fitted with sufficient seating so that the number of workers changing at one time can all sit. A sufficient number of shelves or hooks, lockers for storing clothing and personal belongings should be provided. Change rooms should have adequate lighting and be well ventilated. Additional heating or cooling maybe needed depending on the weather.

8) Provide shower facilities

Work in the mines is often in extreme temperatures, requires enormous physical exertion under dusty conditions and therefore workers need to shower at the end of the shift. At least one shower cubicle should be provided for every ten workers who need to shower and separate showers should be provided for female and male workers. Make sure that each shower is supplied with clean hot and cold water including non-irritating soap or substitute and towels for drying.

6.16 Guidelines for maintaining documentation and legal register

Health and safety documents show what should be done and what has been done to make the workplace healthy and safe for work. Some health and safety records are statutory, i.e. are required to be kept by the MHSa and other legislation. Such records are one of the means the mine can demonstrate that the requirements of the MHSa and its health and safety management plan are being met.

Documents communicate site health and safety rules and control activities on the site and should therefore be up-to-date, cover every area and be drawn up and approved for use by a competent person appointed for that purpose at the mine so that the documents can be trusted to contain the right information.

1. What the MHSa says about documentation and legal registers?

Section 2 (1) (c) of the MHSa states that the owner of a mine must compile an annual report on health and safety at the mine that includes statistics on occupational health and safety that must be kept and the annual medical report of employees exposed to health risks. You can only meet this requirement if you keep records on the important aspects of health and safety, particularly the statutory records-those that MHSa requires you to keep. Examples of such records include:

- Document of the General Health and safety Policy at the mine [Section 8 (1)].
- Records of significant hazards, risk assessments and controls [Section 11 (1) (c)].
- Records of investigation of accidents serious illness and health-threatening occurrence [Section 11 (5) (d)].
- Records of training of every employee [Section 10 (2) (ii)], training of health and safety representative [Section 14 (16)].
- Record of occupational Hygiene measurements [Section 12 (3)].
- Record of medical surveillance for each employee [Section 13 (3) (c)]
- A service record of every employee who perform work in respect of which medical surveillance is required [Section 14 (1)].
- Annual medical report covering employees at the mine showing an analysis of employees' health based on employees' medical surveillance [Section 14 (16)].

2. Why keep records?

- It is required by law to keep health and safety records. These types of records are called statutory records e.g. Section 12 (3) of the MHSa requires the employer to keep a record of occupational hygiene measurements linked to the record of medical surveillance which must be kept for each employee exposed to a health hazard (Section 13 (3) of the MHSa).

Other records include:

- Documentation helps to raise employee awareness of what is needed to achieve health and safety objectives or targets at the mine. Good records make it easier for you to give or communicate health and safety information to employees and for them to gain access to the information themselves by examining the records. For example, work safety rules that have been put on a document enable workers to know what they must do to carry out their work safely.
- Good records enable you keep good watch on how well health and safety is being implemented at the mine and to introduce improvements. For example, once safety rules of a specific task have been put on document, you can then watch workers perform tasks and check whether changes in the rules are needed.
- Records can help you identify hazards and control their risks. A record of the HIRA process is a documented evidence of what actions management is taking to protect the health and safety of employees at the mine. It makes results of risk assessments and controls including safe work procedures to easily reach employees, health and safety representatives, members of the health and safety committee and the Inspector of Mines.
- Records will also help you check whether controls are working well.

- You will need to keep records of any changes you introduce in the workplace so that you can monitor or watch them closely to make sure that they do not introduce new risks to your employees.

3. List of some of the records you need to keep at the mine:

- Document showing the health and safety management plan at the mine.
- Record of significant hazards, risk assessments and controls.
- Safe work procedures for each designated working place (DWP).
- Procedure for HIRA including JSA.
- Health and safety rules for visitors.
- Training (induction training for new and transferred workers and contractors; on-going health and safety training).
- Procedures for the management of contractors and suppliers
- Records of occupational hygiene measurements.
- Records of medical surveillance.
- Annual Medical Records and report.
- Health and safety committee meetings.
- Hazardous substances inventory showing the list of dangerous substances kept at the mine, a record of how these materials are used, a register of all the Manufacturer's safety data sheets that are supplied with each material.
- Records of workplace inspections.
- Machinery, equipment and vehicle inspection, calibration and maintenance records.
- Injury and occupational disease reports.
- Accident and incident investigation register.
- Emergency procedures and record of emergency evacuation drills.
- Audit reports.
- Waste management procedure.
- Disciplinary procedure.

Examples of how you can use a specific record such as minutes of health and safety committee meetings to watch health and safety:

- Minutes will show you the health and safety issues being raised and talked about by employees and Committee members, especially problems repeatedly raised at meetings so you can follow them up.
- Minutes can show you problems that are causing hazards that need to be controlled so you do something about them.
- Show your comments of committee members on what you are doing to control risks so that you can make changes if needed for improvement.
- Some of the comments can help you identify specific training needs.
- Comments or concerns about the way a specific job is being carried out can show you if new rules are required to carry out the job safely.
- Minutes can show you the cost of accidents and incidents to your business.

4. Document control

Occupational health and safety records usually have a lot of detail and are large in size. This means that records have to be well managed or controlled for the health and safety management system to work well. It is good practice to develop a document control procedure that will help you maintain and control health and safety documentation at the

mine in a consistent manner so that they remain current, up-to-date and are approved for use at all times. Managing records involves:

1. Storing records

Select a good place such as a filing cabinet to store your records so that you can easily file them and also get them when needed.



Figure 4: Storage facility (NSW Department of Prim Industries and Overstock Cabinets)

2. **Put someone in charge of records or documentation. This responsibility could be assigned to your health and safety officer or any person on site.**
3. **To make the task of managing records easier, the person in charge must:**
 - Label each record clearly by indicating its subject, date issued or reviewed, person (s) authorising it.
 - Indicate when records are to be collected and where they should be kept.
 - Make sure that everyone wishing to look at any record should easily get it.
 - Check the records from time to time in order to identify those that need to be updated, removed and destroyed or removed and placed in the place for old records called archives in case they are needed any time in future. For example, the Inspector of Mines may want to refer to them to check what was done at the mine to control risks and prevent or reduce accidents. Also remember that some records have a period required by law (statutory period) to hold them. For example, records of occupational hygiene measurements, medical health surveillance and service records of employees who undergo medical surveillance must be kept until the mine closes and delivered to the Medical Inspector if the mine closes [Section 13 (8) (a) and (b) of the MHSa.

A good system of document control requires that:

- A person should be assigned responsibility for issuing and filling of documents and maintaining the Document Control Master List where all documents approved for use

are entered before distribution e.g. inspection forms, induction training sheets, site safety rules, etc.

- Documents show the version, date, name of organisation, department, the function or contact person; initial of the most senior person in the management structure if applicable, the page number.
- Documents should be reviewed regularly, updated and approved by authorised persons before they are issued for use.
- Documents that are currently in operation should be available at all areas of operation.
- Documents that have expired should be removed in good time from the system.
- Documents that need to be kept for longer periods as required by law or for historical reasons should be moved to a special storage called archives.

Documents can be kept in the following forms if easily accessible and can be understood:

- Hard copy
- Film
- Electronically

An example of record keeping relating to employee violations at work

As an employer, you must maintain an individual personal file for each worker at the mine. Each safety violation by the worker is recorded in his/her file and should include the following details:

- Date and time of the violation.
- A description of the violation.
- Type and number of previous violations and warnings issued to the worker.
- The disciplinary action taken for the current violation.
- General comments.

For this system to work, you must prepare and document a disciplinary procedure and make it available by distributing it to all workers so that they are aware and understand the procedures for disciplinary action.

5. Legal registers

It is critical to the health and wellbeing of workers, contractors and their employees and visitors that hazards associated with the operations of the mine are identified, risk assessed and that appropriate control measures are put in-place in order to reduce the risk of harm and maintain a work environment that is safe and free of risk to health. An effective way of managing health and safety at the mine is to begin by obtaining and putting together a list of all the pieces of legislation, regulations and applicable Codes of Practice and DME Guidelines that concern occupational health and safety including environmental issues in mining. This list is called your Legal Register and helps you to know and comply with legal requirements affecting your operations and to search and receive new updates when changes are made.

The owner of a mine or employer must show commitment to complying with legislative and other requirements affecting operations at the mine. To that end the employer must develop and maintain a register of legal and other requirements to which the mine must conform. It is the responsibility of owner of the mine or employer to identify and address those requirements.

Legal Register contains the more significant and recent Acts and Regulations relating to:

- Health and safety.
- Environmental/pollution control.
- Waste disposal.

It is good practice to include other codes of practice and Guidelines such as those issued by the Mine Health and Safety Inspectorate under DMR

5.1 Structure of the legal register

Entries on the register should include the following:

- Number of the Act e.g. No. 29.
- Name of the Act: e.g. The Mine health and safety Act, 1996.
- Applicable requirements: here you briefly describe the main requirements that are relevant to your operations.
- Demonstration of compliance: Here you show that you are meeting the requirements by providing evidence of what you are doing to comply. You can use the example below to compile a legal register, adding other relevant regulations and legislation, CoPs and Guidelines.

Table 13: Example: Structure of legal register

Health and Safety Legislation			
No.	Name of legislation	Applicable issues and requirements(short descriptive summary of the law)	Demonstration of compliance (show evidence of how you are complying with the requirements)
29	Mine Health and Safety Act, 1996	This Act is the main Act from which other pieces of health and safety legislation and regulations come. The Act is divided into 8 chapters and 106 Sections. Main chapters to note include: Chapter 1: Health and Safety at Mines (Sections 2-24); Chapter 3: Health and safety representatives and committee (Sections 25-40); Chapter 5: Inspectorate of Mine health & Safety (Sections 47-74), etc.	Occupational Health and safety policy statement Health and safety management plan; Safe work procedures Record of significant hazards, risk assessments & controls; Accident/incident and disease reports; Records of occupational Hygiene measurements; Records of employees' medical Surveillance; Service records and Annual medical report; Routine HSE inspections; Audits as scheduled; Annual Health and safety report, etc.

5.2 Obtaining changes in legislation, new CoPs and Guidelines

It is good practice to constantly up-date the register when there are changes or new legislation and regulations including relevant codes of practice and Guidelines have been adopted. This means that you must have a strategy put into a special procedure to obtain changes or new legislation as well as published DMR Codes of practice and Guidelines. One way of obtaining changes or new legislation and regulations is to take a subscription to receive the Government Gazette where these are published in the form of notices. Free downloads may be available on relevant websites, e.g. Department of Mineral Resources website.

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8 APPENDICES

Appendix A: Sample General Health and Safety Policy

This policy will apply to _____ at all locations.
(Name of Mine)

P O L I C Y

_____ is committed to providing a healthy and safe work environment for its workers and preventing occupational illness and injury. To express that commitment, we issue the following policy on occupational health and safety.

As the employer, _____ is responsible for the health and safety of its workers.

_____ will make every effort to provide a healthy and safe work environment.

We are dedicated to the objective of eliminating the possibility of injury and illness.

As _____, I give you my personal promise to take all reasonable precautions to prevent harm to workers.

Supervisors will be trained and held responsible for ensuring that the workers, under their supervision, follow this policy. They are accountable for ensuring that workers use safe work practices and receive training to protect their health and safety.

Supervisors also have a general responsibility for ensuring the safety of equipment and facility.

_____ through all levels of management will co-operate with the occupational health and safety committee, or the representative and workers to create a healthy and safe work environment. Co-operation should also be extended to others such as contractors, neighbouring businesses, officers, etc.

The workers of _____ will be required to support this organization's health and safety initiative and to co-operate with the occupational health and safety committee or representative and with others exercising authority under the applicable laws.

It is the duty of each worker to report to the supervisor or manager, as soon as possible, any hazardous conditions, injuries, incidents, or illness related to the workplace. Also, workers must protect their health and safety by complying with applicable Acts and Regulations and to follow policies, procedures, rules and instructions as prescribed by the Mine Health and Safety Act 1996

_____ will, where possible, eliminate hazards and, thus, the need for personal protective equipment. If that is not possible, and where there is a requirement, workers will be required to use safety equipment, clothing, devices and materials for personal protection.

_____ recognizes the worker's duty to identify hazards and supports and encourages workers to play an active role in identifying hazards and to offer suggestions or ideas to improve the health and safety program.

Signed: _____ Title:.....

....

This policy has been developed in consultation with the Health and Safety Committee, representative or workers.

(Adapted from: Workers Compensation Board of PEI (2009) Guide to workplace health & safety programs)

Appendix B: Sample of Specific Policy (Violence and Sexual Harassment Policy)

..... (Name of Mine) believes in the prevention of Violence and Harassment and promotes an abuse-free environment in which all people respect one another and work together to achieve common goals. Any act of violence or harassment committed by or against any worker or member of the public is unacceptable conduct and will not be tolerated.

The purpose of this policy is to ensure that individuals are aware of and understand that acts of Violence or Harassment are considered a serious offence for which necessary action will be imposed, those subjected to acts of Violence or Harassment are encouraged to access any assistance they may require in order to pursue a complaint, and individuals are advised of available recourse if they are subjected to, or become aware of, situations involving Violence or Harassment.

“Workplace Harassment” means engaging in a course of vexatious comment or conduct against a worker in a workplace that is known or ought reasonably to be known to be unwelcome.

“Workplace Violence” means,

- (a) The exercise of physical force by a person against a worker, in a workplace, that causes or could cause physical injury to the worker,
- (b) An attempt to exercise physical force against a worker, in a workplace, that could cause physical injury to a worker,
- (c) A statement or behaviour that is reasonable for a worker to interpret as a threat to exercise physical force against the worker, in a workplace, that could cause physical injury to the worker.

We at..... are committed to:

- investigating reported incidents of Violence and Harassment in an objective and timely manner;
- taking necessary action; and
- Providing appropriate support for victims.

Acts of Violence and Harassment can take the form of physical contact or non-physical behaviours. Abuse in any form is an insidious practice that erodes mutual trust and confidence which are essential to..... operational effectiveness. Acts of Violence and Harassment destroy individual dignity, lower morale, engender fear, and break down work unit cohesiveness.

Supervisors at every level must be knowledgeable about and sensitive to the many forms that Violence and Harassment can take. These may involve unwarranted or inappropriate comments, gestures, physical contact or assault, or the display of offensive material. It may or may not be deliberate. It may in fact be unintended; the test is whether a reasonable person knows or ought to have known that the behaviour would be considered unwelcome or offensive by the recipient.

Acts of Violence and Harassment may occur as a single event or may involve a continuing series of incidents. They may involve the abuse of authority or position, relations among peers, visitors and external stakeholders. Abuse can victimize both men and women, and may be directed by or towards..... workers, visitors or members of the public (including domestic abuse).

No action shall be taken against an individual for making a complaint unless the complaint is made maliciously or without reasonable and probable grounds. No employee or any other individual affiliated with this organization shall subject any other person to violence or harassment.

Signature_____

Name of authorized person

Position or title

Adapted from: Interprovincial Insulation Inc (2013) Health& Safety Policy & Procedures Manual-
Canadian Standards Association

Appendix C: Sample procedure for participation and consultation at the mine

Aim

The aim of this procedure is to ensure that workers or their representatives participate and are consulted in matters concerning their health and safety at the mine to comply with the requirements of the Mine Health and Safety Act 1996.

The participation of workers will be ensured through their:

- (a) Appropriate involvement in hazard identification, risk assessment and determination of controls
- (b) Appropriate involvement in incident investigations
- (c) Involvement in the development and review of Occupational Health policies and objectives
- (d) Consultation where there are changes that affect their occupational Health and Safety
- (e) Representation on Occupational Health and Safety matters

SCOPE

This procedure is applicable to all employees, contractors and visitors working for or on behalf of.....

PURPOSE

The purpose of this procedure is to:

- (a) To involve employees in the development and review of policies and procedures to manage risks.
- (b) To ensure that all employees are consulted where there are any changes that affect workplace health and safety.
- (c) To ensure that other interested parties, where required, are informed and
- (d) To ensure that employees are represented on health and safety matters.
- (e) To ensure that employees are informed as to who their Occupational Health and Safety Representative(s)
- (f) To ensure that employee involvement and consultation arrangements are documented.
- (g) The purpose of this procedure is to ensure that pertinent Occupational Health and Safety information is communicated to and from employees.

RESPONSIBILITIES

(a) Health and safety representatives and health and safety committee:

.....will establish a health and safety committee comprising of management and employees to promote participation and consultation on Health and Safety matters; facilitate election of Safety Representatives to represent employees under their control and ensure that there are systems in place to effectively involve employees in a participative programme

(b) Supervisors and Managers will:

Ensure that Health and Safety Representatives are given reasonable opportunities to participate in the consultative process and employees have the opportunity to participate in the process for improving Health and Safety in the workplace.

PROCEDURE

..... will involve and consult employees, contractors and external interested parties on the following:

(a) Risk assessment

Employees will take part in the risk assessment for there are of operation. Management will ensure that employees are involved in the development and review of risk assessment procedures

(b) Changes that could affect health and safety

Any change in the organization which may have a potential to affect the health of employees will be communicated to the general workforce by means of, meetings, memos, EBMS and email.

(c) Incident Investigation

All relevant employees will take active part in incident investigations. Management will ensure that the outcomes of the investigations are communicated to all employees

(d) Development and review of policies

Relevant employees will be involved in the review of policies and procedures. The outcomes of the reviews will be communicated to the rest of the workforce by means of memos, email, meetings and tool box talks.

Representation on health and safety matters

Safety representatives will take part in forums where:

- (a) Risks are being assessed, and when risk assessments are being reviewed
- (b) Decisions are being made about measures to eliminate or control risks
- (c) Decisions about facilities for welfare of employees are made
- (d) Changes are proposed which could affect the health and safety of employees

Consultation with contractors

Management will ensure that all contractors working for or on behalf of the mine are consulted on matters related to their safety and health while on site

Record-keeping

Records of the consultative process will be kept as per records control procedure

Prepared by:
Authorized by:

Appendix D: Legal appointments template

Name of person	Mine No.	Designation Title	Department	Area of Responsibility	CV	Effective date of appointment	Expiry date of appointment	Description of responsibility	Applicable Regulations