Surface Mining
Level-II

Based on December,2018, Version OS and April, 2021, V1 Curriculum

Module Title: - Conducting sustainable and environmental mining practices
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LG #42	LO #1- Identify hazards

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Accessing, interpreting and applying compliance documentation on risk management
- Inspecting and analyzing work area conditions to identify Potential hazards
- Accessing, interpreting and applying existing procedures to control identified hazards
- Identifying and reporting hazards
- Recognizing the type and scope hazards and their impact

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Access, interpret and apply compliance documentation
- Inspect and analyze work area conditions to identify Potential hazards
- Access, interpreting and applying existing procedures to control identified hazards
- Identify and report hazards
- Recognize the type and scope hazards and their impact

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. Perform “the Learning activity performance test”
7. If your performance is satisfactory proceed to the next learning guide,

Information Sheet 1- Accessing, interpreting and applying compliance documentationon risk management.

1.1 Introduuction

Mining is a hazardous operation and consists of considerable environmental, health and safety risk to miners. Unsafe conditions in mines lead to a number of accidents and cause loss and injury to human lives, damage to property, interruption in production etc. But the hazards cannot be completely obliterated and thus there is a need to define and reckon with an accident risk level possible to be presented in either quantitative or qualitative way.

Hazard: is a potential source of harm or adverse health effect on a person.

The terms Hazard and Risk are often used interchangeably but this simple example explains the difference between the two.

Risk: is the likelihood that a person may be harmed or suffers adverse health effects if exposed to a hazard.

1.2 Risk management

Risk management is the process of identifying hazards and controlling risks. The risk management process involves four main steps:

- ✓ risk assessment
- ✓ risk control and risk rating;
- ✓ risk transfer; and
- ✓ risk review.

Risk management also implies that the culture, processes and structures that are directed towards the effective management of potential opportunities and adverse effects.

- **Risk assessment**

Risk assessment is the first step in the risk management process. It involves identifying potential hazards.

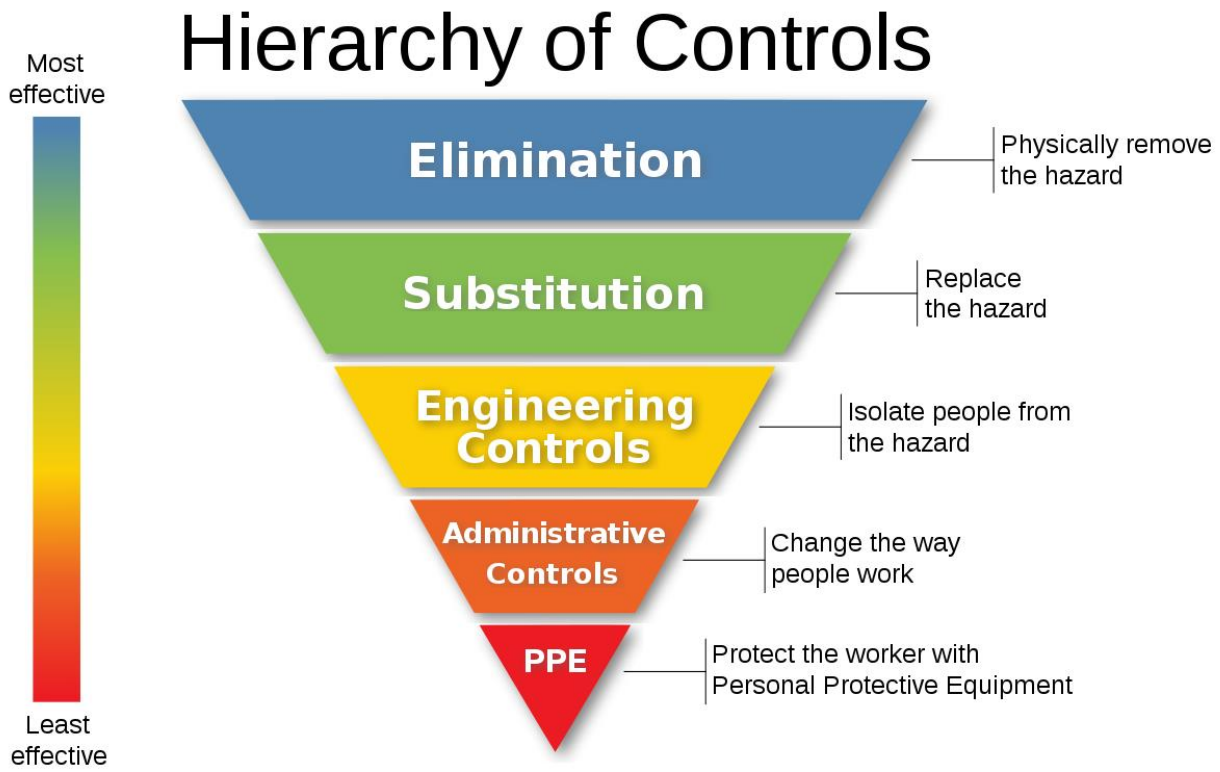
Event Managers should consider four categories when identifying event hazards:

- ✓ human (e.g. availability of health and security personnel);
- ✓ natural (e.g. event location, condition of the event venue,);
- ✓ environmental (e.g. weather, waste management); and
- ✓ technological (e.g. equipment safety, availability of utilities)

- **Risk control**

When potential hazards have been identied, Event Managers should devise strategies to eliminate or reduce the chance of the risks occurring. There are **five** methods that can be used to eliminate or reduce risk.

- ✓ Elimination
- ✓ Subsititution
- ✓ Engineering Controls
- ✓ Administrative Controls
- ✓ Personal protective Equipment



- **Risk rating**

Once the risk control strategies have been identied, a risk rating can be determined for each hazard. A risk rating is based on **two** factors:

A**)likelihood** (i.e. the possibility of the risk occurring once risk control strategies have been put in place)

B) **consequence** (i.e. what could happen and the severity after allowing for the risk control strategies in place).

- **Risk transfer**

Event Managers may identify signicant risks that cannot be managed within existing resources and capabilities.

- **Risk review**

This is the Final step in the risk management process. It involves reviewing each of the preceding steps over the course of the event to ensure that risks are being adequately managed. It also enables new risks to be identied and controlled.

1.3. Overview of Documents

Documents include all the written policies, processes, and procedures of the mining. In order to develop surface mining documents.

1.3.1 Accessing, Documenting & Recording

The management of accessing, documenting & recording is one of the essential elements of the quality system. The management system addresses both use and maintenance of documents and records. A major goal of keeping documents and records is to find information whenever it is needed.

- **Characteristics of records are that they:**
  - ✓ Need to be easily retrieved or accessed;
  - ✓ Contain information that is permanent, and does not require updating. Some examples of records include: completed forms, charts, sample logs and quality control information. Information is the major product of the mine site, so manage it carefully with a good system for the miner's documents and records.
- **Policy**

A policy is a documented statement of overall intentions and direction defined by those in the organization and endorsed by management. Policies give broad and general direction to the quality system. They:

- ✓ tell "what to do", in a broad and general way;
- ✓ include a statement of the organizational mission, goals, and purpose;
- ✓ Serve as the framework for the quality system, and should always be specified in the quality manual. Although there are national policies that affect mining operations, each mining site will develop policies specific to its own operations.

- **Procedures**

Procedures are the specific activities of a process and easily described as the performance of a test. A procedure tells “how to do it”, and shows the step-by-step instructions that mine site should carefully follow for each activity. The term Standard Operating Procedure is often used to indicate these detailed instructions on how to do it. **Job aids**, or **work instructions**, are shortened versions of Standard Operating Procedures that can be posted at the bench for easy reference on performing a procedure.

- **Accessibility**

The documents needed in the work process must be accessible to all staff. Persons managing mining site should have the procedures for site management directly available to them. All staff must have access to safety manuals.

- **Compliance documentation**

  are the documents that must be completed in a job. These documents are required to show that the workplace is following the established laws, set practices and standards that must be in place.

  Hence, Compliance documentation" means specific documents or information including records, reports, observations and verbal responses required to verify compliance with standards by a facility or program.

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Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define Risk management? 3 point
2. List at least three method of risk reduce? 4 point

Note: **Satisfactory rating – Above 7 points** **Unsatisfactory – below 7 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 2- Inspecting and analyzing work area conditions to identify Potential hazards.

2.1. Potential hazards

is any source of potential damage, harm or adverse health effects on something or someone. Basically, a hazard is the potential for harm or an adverse effect (for example, to people as health effects, to organizations as property or equipment losses, or to the environment).

- **Site working instructions**

It may include:

- ✓ applicable legislation and code of practice relating to the industry, dangerous and hazardous goods, environmental protection and safety and health
- ✓ worksite safety management systems
- ✓ manufacturer's documentation and handbooks
- ✓ workplace operating procedures and policies
- ✓ materials safety data sheet
- ✓ emergency procedures
- ✓ safety alert

- **Safe Working Instructions**

Safe Working instructions are written instructions for a process or activity that outlines the recommended safe method of undertaking the process or activity. Written Safe Working instructions are an essential part of a safe system of work and are an important part of an overall occupational health and safety program. Safe working instructions provide information necessary to assist all staff and site workers to perform tasks safely and reliably.

There are f**ive** methods to identify workplace (mine site) hazards.

1. **informal observations, and formal observation programs;**

An informal observation process is nothing more than being watchful for hazards and unsafe behaviors throughout the work shift. No special procedure is involved. All employees should be expected to look over their work areas once in a while.

2. **comprehensive company-wide surveys;**

One of the most effective proactive methods to collect useful data about the hazards and unsafe behaviors in mining site workplace is the formal observation program because it includes a written plan and procedures.

3. **individual interviews;**

An interview is a verbal exchange conducted one-on-one, preferably in private, and has the potential to gather more information.

4. **walk-around inspections;**

walk-around inspection is often done by employees at the workplace who walk around observing the workplace and asking questions in public.

5. **documentation review.**

Reviewing the document of the site Regularly and check hazards.

In all but the smallest and least dangerous of workplaces, written inspection reports are necessary to record hazards discovered, responsibility assigned for correction, and tracking of correction to completion. Formal safety inspections should include a written report with recommendations for corrective action.

- **A written record will help ensure:**

✓ Assignment of responsibility for hazard correction.
✓ Tracking of correction to completion.
✓ Identification of problems in the controls system when the same types of hazards keep appearing even after correction is verified.
✓ Identification of problems in the accountability system.
✓ Identification of hazards for which no prevention or control has been planned.

Self-Check – 2	Written test

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. Mention f**ive** methods to identify workplace (mine sit) hazards?(3)
2. What is Potential Hazards (3)?

Note: **Satisfactory rating - 6 points** **Unsatisfactory - below 6points**

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Information Sheet-3	Accessing, interpreting and applying existing procedures to control identified hazards

3.1 Control Measures

Control measures include actions that can be taken to reduce the potential of exposure to the hazard, or the control measure could be to remove the hazard or to reduce the likelihood of the risk of the exposure to that hazard being realised. A simple control measure would be the secure guarding of moving parts of machinery eliminating the potential for contact. When we look at control measures we often refer to the hierarchy of control measures.

Table 3.1 methods of controlling hazards

1. Eliminate the hazard	Elimination of the hazard is not always achievable though it does totally remove the hazard and thereby eliminates the risk of exposure. An example of this would be that petrol station attendants in Ireland are no longer exposed to the risk of chronic lead poisoning following the removal of lead from petrol products sold at forecourts.
2. Substitute the hazard with a lesser risk	Substituting the hazard may not remove all of the hazards associated with the process or activity and may introduce different hazards but the overall harm or health effects will be lessened. In laboratory research, toluene is now often used as a substitute for benzene. The solvent-properties of the two are similar but toluene is less toxic and is not categorised as a carcinogen although toluene can cause severe neurological
	harm.

3. Isolate the hazard	Isolating the hazard is achieved by restricting access to plant and equipment or in the case of substances locking them away under strict controls. When using certain chemicals then a fume cupboard can isolate the hazard from the person,
	similarly placing noisy equipment in a non-accessible enclosure or room isolates the hazard from the person(s).
4. Use engineering controls	Engineering Controls involve redesigning a process to place a barrier between the person and the hazard or remove the hazard from the person, such as machinery guarding, proximity guarding, extraction systems or removing the operator to a remote location away from the hazard.
5. Use administrative controls	Administrative controls include adopting standard operating procedures or safe work practices or providing appropriate training, instruction or information to reduce the potential for harm and/or adverse health effects to person(s). Isolation and permit to work procedures are examples of administrative controls.
6. Use personal protective equipment	Personal protective equipment (PPE) include gloves, glasses, earmuffs, aprons, safety footwear, dust masks which are designed to reduce exposure to the hazard. PPE is usually seen as the last line of defence and is usually used in conjunction with one or more of the other control measures. An example of the weakness of this control measure is that it is widely recognised that single-use dust masks cannot consistently achieve and

	maintain an effective facepiece-to-face seal, and cannot be adequately fit-tested and do not offer much, if any real protection against small particulates and
	may lead to a false sense of security and increase risk. In such instances an extraction system with fitted respirators may be preferable where the hazard may have significant health effects from low levels of exposure such as using isocyante containing chemicals.

Based on the above procedures the job hazard analysis is also very important to identify hazards

- **Job Hazard Analysis is**

✓ A step by step process
✓ Analyzing a job to determine hazards
✓ A look at the Environment the task is performed in
✓ Recommending controls
✓ Aid in developing safe work procedures

Self-Check -4	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define what mean job hazard analysis? 3point
2. Write the control measure of hazards? 4point

Note: **Satisfactory rating - 7 points** **Unsatisfactory - below 7 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

information Sheet-4	Identifying and reporting hazards

During the inspection methods to identify the hazards in the mining site or mining area there are different sources of risk:

- **Sources of risk in mines**

✓ Blasting
✓ Inundation
✓ Slope failure
✓ dumper movements
✓ ower/ electricity Parting collapse
✓ Deployment of contractual persons Fire
✓ Ore handling plant
✓ Environment Acid mine drainage
✓ Fire risk Toxicity of gases
✓ Water contamination.

After Inspecting the mining Site, identifying and understanding the source and types of hazards use the following Chech list and Report it.

Whatever the format of the checklist, provide space for the inspectors' signatures and the date.

Table 4.1 check list of hazard report.

Area/Issue	Examples	Date	Sign.	Remark
1. Environment	wrenches, screwdrivers, saws, power tools, explosive actuated tools			
2. Electrical	flammable, explosive, oxidizing, gases under pressure, corrosive, toxic/health hazards, biohazardous infectious, environmental			
3. Fire protection equipment	conveyors, cranes, hoists, hoppers, carts, dollies, bins, etc.			
4. Hand tools	hard hats, safety glasses, respirators, safety footwear, gloves, etc.			
5. Hazardous products	boilers, vats, tanks, piping, hoses, couplings, valves, hydraulics, etc.			
6. Materials handling	mills, shapers, cutters, borers, presses, lathes, robotics, etc.			
7. Personal protective equipment	ladders, scaffolds, platforms, catwalks, staging			
8. Pressurized equipment	engines, electrical motors, compressor equipment			
9. Production equipment	racks, bins, shelves, cabinets, closets, yards, floors			
10. Personnel support equipment	gear covers, pulleys, belt screens, work station, guards, railings, drives, chains			
11. Powered equipment	valves, emergency switches, cutoffs, warning systems, limit switches, mirrors, sirens, signs			
12. Storage facilities	start-up switches, steering mechanisms, speed controls, manipulating controls			
13. Protective guards	handles, eye-bolts, lifting lugs, hooks, chains, ropes, slings			
14. Safety devices	safety showers, eyewash fountains, first aid supplies, contact list for first aid responders, etc.			
15. Controls	discussion with or observation of employees who may mention work scheduling issues,			

	workload (pace of work/too much/too little), hours of work, fatigue, issues that interrupt concentration,poor communication, conflicting demands,working in conflict with others, working in social isolation, or working alone			
16. Lifting components	wrenches, screwdrivers, saws, power tools, explosive actuated tools			
17. Hygiene and first aid facilities	flammable, explosive, oxidizing, gases under pressure, corrosive, toxic/health hazards, biohazardous infectious, environmental			
18. Psychosocial hazards	conveyors, cranes, hoists, hoppers, carts, dollies, bins, etc.			

Self-Check -4	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Test I Short Answer

1. Write at least three sources of risk in mines(2)
2. Prepare check list for hazard reports(3)

Note: **Satisfactory rating – 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet-5	**Recognizing the type and scope hazards and their impact**

5.1 Impact of mining

Mining has **impacts** on virtually every aspect of sustainable development and human rights, and industrial-scale mining projects. Mining has particularly strong environmental and social impacts on communities and areas near mine sites. These impacts are best understood when viewed in the various phases in the life of a mine: expecially, mining operations and mine closure vegetation covers, disturbance of wildlife habitat and dust pollution.

The mining operation phase involves extracting the minerals; removing and storing earth, rocks and waste; and processing and transporting minerals. The impacts of mining operations can differ greatly depending on the **type** of mineral being mined, the geological features of the **deposit** and mining technologies used. Major environmental impacts of mining include:

- ✓ Production of waste,
- ✓ Release of toxic and hazardous waste,
- ✓ Air and depletion,
- ✓ The loss of productive land a
- ✓ Pollution and emissions,
- ✓ Water pollution
- ✓ Ecosystems.

Moreover, mining can magnify or multiply existing environmental risks and hazards.

However, many of these impacts can be signicantly reduced with good management of environmental impact, including the use of **appropriate technologies.** Nevertheless, the growing demand for minerals and metals is leading to increased incidences of mining in environmentally sensitive areas – watersheds and glaciers, as well as areas prone to earthquakes and tropical storm

Overall, mining leads to the loss of productive land, although with good planning and management of mining and its closure, mined land can be used for other purposes. Mining can also leave a legacy of long-term environmental impacts. After mine closure, jobs are lost, not only in the mine, but also in companies supplying to the mine. At the mine closure phase, companies are required to wind down mineral extraction and processing, decommission mining processing facilities, conduct land reclamation and rehabilitation, close and seal waste facilities, and remove mine workers' camp and equipment. Many jurisdictions now require companies to make nancial provisions for mine closure and rehabilitation. As part of their corporate responsibility, companies also take measures to retrain and relocate workers.

- **Types of Hazards in mining area**

a) . **biological** – bacteria, viruses, insects, plants, birds, animals, and humans, etc.,
b) **chemical** – depends on the physical, chemical and toxic properties of the chemical,
c) **Ergonomic** – repetitive movements, improper set up of workstation, etc.,
d) **physical** – radiation, magnetic fields, temperature extremes, pressure extremes (high pressure or vacuum), noise, etc.,
e) **psychosocial** – stress, violence, etc.,
f) **safety –** slipping/tripping hazards, inappropriate machine guarding, equipment malfunctions or breakdowns.

Self-Check -7	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

TEST I short Answer

1. List types of hazards(2)
2. Write Major environmental impacts of mining (3)

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

LG #43	LO #2- Assess and identify unacceptable risk

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Considering and determining the likelihood of the event
- Evaluating and determining the consequence of the event occurred
- Considering and determining the risk level
- Identifying the criteria for acceptability/unacceptability of the risk
- Evaluating the risk

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, **you will be able to**:

- Consider and determine the likelihood of the event
- Evaluate and determine the consequence of the event occurred
- Consider and determine the risk level
- Identify the criteria for acceptability/unacceptability of the risk
- Evaluate the risk

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
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6. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
7. If your performance is satisfactory proceed to the next learning guide,

Information sheet 1	Considering and determining the likelihood of the event

1.1 Introduction

For likelihood,using qualitative values, consequence and risk levels are very important.

The likelihood, or possibility, that harm (injury, illness, death, damage etc) may occur from exposure to a hazard.

The likelihood levels can be described as frequency values or with respect to how easy it is for a person to exploit a threat.

For some threats it is easier to think of the likelihood in the form of frequency or a probability value.

Likelihood" **is** used to refer to the chance of something happening, whether defined, measured or determined objectively or subjectively, qualitatively or quantitatively, and described using general terms or mathematically (such as a **probability** or a frequency over a

Risk

1. Risk is the chance of or probable danger, and loss, injury or other adverse consequences to human life.
2. It Is the probability of injury, disease, or death under specific circumstances
3. The chances of something happening that will have an impact on objectives. It is measured in consequence and likelihood.

   Therefore **Risk = Consequence * Probability * Exposure**

   Where, **Consequence** = degree of harm that could be caused to people exposed to the hazard

   Exposure = How often and how long people are exposed to the hazard

   Probability = Chance that a person will be harmed when they are exposed to the risk

So, Likelihood can be determined as

- ✓ Very high
- ✓ High
- ✓ Moderate
- ✓ Low

See table 1.1

Table 1.1: Definition of likelihood levels

Likelihood	Frequency	Ease of misuse and motivation

Very high	Very often, occurs more often than every 10th connection, i.e. more frequently than 10 % of the time/cases.	Can be done without any knowledge about the system; or without any additional equipment being used; or it can be performed by wrong or careless usage.
High	Quite often. Occurs between 1 % and 10 % of the time/cases.	Can be done with minor knowledge about the system; or without any additional equipment being used; or it can be performed by wrong or careless usage.
Moderate	May happen. Occurs between 0.1 % and 1 % of the time/cases.	Normal knowledge about the system is sufficient; or normally available equipment can be used; or it can be performed deliberately.
Low	Rare. Occurs less than 0.1 % of the time/cases.	Detailed knowledge about the system is needed; or special equipment is needed; or it can only be performed deliberately and by help of internal personnel.

Information sheet 2	**Evaluating and determining the consequence of the event occurred**

2.1 Consequense of risk event

Consequence is degree of harm that could be caused to people or Enviroment exposed to the hazards.

Consequences come in many forms.The major consequence categories are Safety, Financial, and Compliance breaches (i.e. breaking the rule).

Risk is chances of something happening that will have an impact on objectives. It is measured in consequence and likelihood.

It is estimating the probably zone of impact of accidents as well as the scale and/or probability of damages with respect to human beings and plant equipment and other structures.

The outcome of an event or situation expressed qualitatively or quantitatively, being a loss, injury, disadvantage or gain.

Consequence:	
Small	For the service provider: No violation of law; or negligible economic loss which can be restored; or small reduction of reputation in the short run.
Moderate	For the service provider: Offence, less serious violation of law which results in a warning or a command; or economic loss which can be restored; or reduction of reputation that may influence trust and respect.
Severe	For the service provider: Violation of law which results in minor penalty or fine; or a large economic loss which cannot be restored; or serious loss of reputation that will influence trust and respect for a long time.
Catastrophic	For the service provider: Serious violation of law which results in penalty or fine; or considerable economic loss which cannot be restored; or serious loss of reputation which is devastating for trust and respect.

Information sheet 3	**Considering and determining the risk level**

3.1 Risk

The chance of something happening that will have an impact upon objectives. It is measured in terms of consequences and likelihood

3.2 Risk levels

The level of risk is a combination of the level of consequences and the likelihood of these consequences materializing. For each and every objective a level of risk can be

determined. Either quantitatively or qualitatively. Therefore, it is also possible to choose a level of risk that is the boundary between acceptable and unacceptable risk.

- There are three distinct levels for risk:
- ✓ **Low,**
- ✓ **Medium, and**
- ✓ **High**

The risk value for each threat is calculated as the product of consequence and likelihood values, The shading of the matrix visualizes the different risk levels. Based on the acceptance criteria, the risk level *High* is decided t o be unacceptable. Any threat obtaining this risk level must be treated in order to have its risk reduced to an acceptable level.

Risk level:	
Low	Acceptable risk. The service can be used with the identified threats, but the threats must be observed to discover changes that could increase the risk vel.
Medium	The risk can be acceptable for this service, but for each threat the development of the risk must be monitored on a regular basis, with a following consideration whether necessary measures have to be implemented.
High	Not acceptable risk. Can not start using the service before risk reducing treatment has been implemented.

Calculating Risk Levels

Risk levels are calculated as the product of the LIKELIHOOD and IMPACT (to the Mining comppany) of a potential threat event / threat event category:

Table 3.1 risk level calculation methods

Likelihood \ Impact	Negligible	Minor	Moderate	Significant	Severe
Very Likely	Low	Moderate	High	High	High
Likely	Low	Moderate	Moderate	High	High
Possible	Low	Low	Moderate	Moderate	High
Unlikely	Low	Low	Moderate	Moderate	Moderate
Very Unlikely	Low	Low	Low	Moderate	Moderate

Information sheet 4	Identifying the criteria for acceptability/unacceptability of the risk

4.1 Acceptable /Unacceptable risk

Risk acceptance criterion defines the overall risk level that is considered acceptable, with respect to a defined activity period. The criteria are a reference for the evaluation of the need for risk reducing measures, and therefore need to be defined prior to initiating the risk analysis. Additionally, the risk acceptance criteria must reflect the safety objectives and the distinctive characteristics of the activity.

It is a risk management term. The acceptability of the risk depends on scientific **data, social, economic**, and **political factors**, and the p**erceived** benefits arising from exposure to an agent.

The risk acceptance criteria may be defined in either qualitative or quantitative terms, depending on the expression for risk.

- According to the purpose and the level of detail for the risk analysis, the acceptance criteria may be:

✓ High-level criteria for quantitative studies

✓ Risk matrices and the ALARP(as low as reasonably practicable) principle

✓ Risk comparison criteria

On the other hand, The level of risk is a combination of the level of consequences and the likelihood of these consequences materializing. For each and every objective a level

of risk can be determined. Either quantitatively or qualitatively. Therefore, it is also possible to choose a level of risk that is the boundary between acceptable and unacceptable risk. These boundaries are also called risk criteria. They determine at which level one can no longer **accep**t the consequences and likelihood of occurrence that the company have identified as a possibility.

So, when the combination of consequences and likelihood is such that it goes beyond company risk criteria, it becomes an **unacceptable level** of risk and you either have to change company objective(s), or have to start managing risk in order to modify the effects of uncertainty on your objectives as deemed necessary.

Information sheet -5	Evaluating the risk

5.1 Risk Evaluation

To **evaluate risks**, it is worthwhile **ranking** them once identified. This can be done by considering the consequence and probability of each **risk.**

Risk evaluation is the process to determine the significance of each risk. There are two ways to evaluate risks:

1. **Qualitative Risk Analysis.** Qualitative analysis such as rating probability and impact should always be performed. This allows you to quickly prioritize and rank your risks.
2. **Quantitative Risk Analysis.** Quantitative analysis is not always performed. This analysis requires more time but provides more data to aid in making decisions.

5.2 Purpose of evaluating risk

in order to:

- **have the greatest impact.** Eighty percent of the impact will come from twenty percent of the risks. What are the *vital few things* that we should do that will have the greatest impact on minimizing threats and maximizing opportunities?
- **respond wisely and appropriately.** The goal of evaluating risks is to discriminate between one risk and another. This aids us in determining the amount of effort to invest in developing response plans.
- **assign resources suitably.** Assign your most skilled, knowledgeable resources to the projects with the greatest risk.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. Write two way of evaluating risk(2)
2. What is risk evaluation(4)

Note: **Satisfactory rating - 6 points** **Unsatisfactory - below 6 points**

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Answer sheet

Test I

1._____

2. _____

3._____

4._____

LG #44	LO #3- Identify and recommend controls

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Identifying and reporting the range of controls
- Conducting detailed analysis of feasible options and identification of resource requirements
- Selecting the most appropriate control and communicate to the supervisor

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, **upon completion of this learning guide, you will be able to**:

- Identify and report the range of controls
- Conduct detailed analysis of feasible options and identification of resource requirements
- Select the most appropriate control and communicate to the supervisor

Learning Instructions:

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7. If your performance is satisfactory proceed to the next learning guide,

Information Sheet - 1	Identifying and reporting the range of controls

1.1 Hazard identification

It is the process of examining each work are a and work task for the purpose of identifying all the hazard s which are “inherent in the job”.

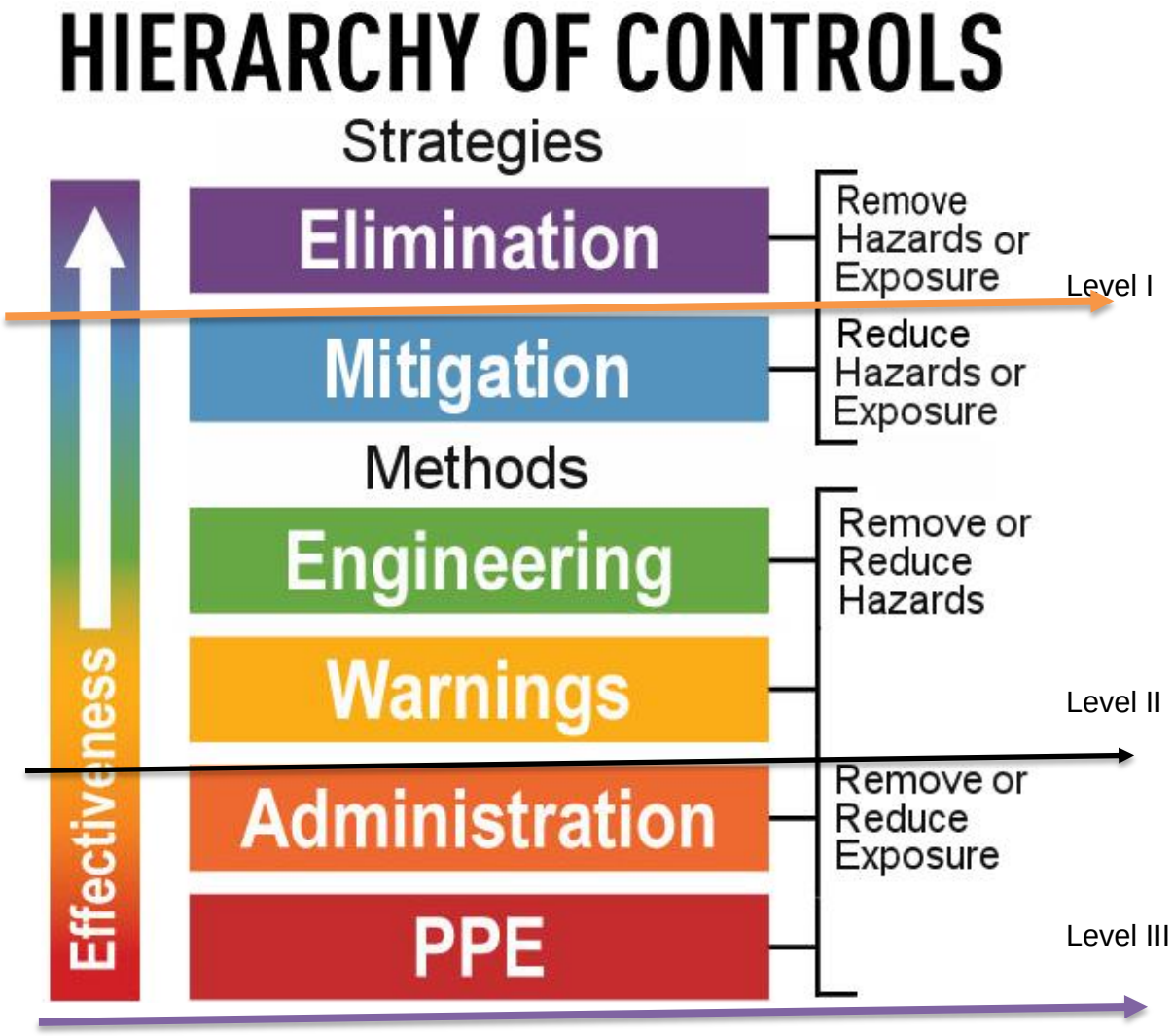
Workplace hazard identification, assessment and control is an on-going process.

It should be undertaken at various times, including:

- ✓ If it has not been done before.
- ✓ When a haza rd has been identified
- ✓ When a change to the workplace may introduce or ch ange a hazard. Such as when changes occur to the workequipment, practices, procedures or environment.
- ✓ As part of responding to a workplace incident, even where an injury has not occurred.
- ✓ Where new information about a risk becomes availa ble or concerns about a risk are r aised by workers
- ✓ At regularly scheduled times appropriate to the workplace

1.2 Range Controls

All hazards that have been assessed should be dealt with in order of priority. The most effective control option/s should be selected to eliminate or minimise risks. The Hierarchy of Controls (see diagram below) ranks control options from highest level of protection and re liabili ty to lowest.


HIERARCHY OF CONTROLS
Strategies
Elimination
Remove Hazards or Exposure
Level I
Mitigation
Reduce Hazards or Exposure
Methods
Engineering
Remove or Reduce Hazards
Warnings
Level II
Administration
Remove or Reduce Exposure
PPE
Level III
Effectiveness

Level 1 Control Measures

1.**Eliminate the Hazard** The most effective control measures eliminate the hazard and associated risks. This can be achieved through removing the hazard or selecting alternate products or equipment to eliminate the risk. If a hazard cannot be eliminated then risks can be minimised by lower control measures.

Level 2 Control Measures

These are used to minimise the risks and involve on or a combination of the foll owing;

a) **Substitute the hazard**: substitute a substance, method or materia l to reduce the risk or the hazard

b) **Isolate the hazard:** separa te the hazard fro m the work place or people, For example;

   a. Chemical store room, or a Mining site kept locked except to an authorised person.
   b. Lock out procedures on faulty equipment.
   c. Appropri ate guard ing for machinery .

c) **Use engineering controls:**
modify existing machinery or plant or purchase different machinery or plant to provide a phys ical solution. For example;

   a.Trolleys, hoists or cranes
   .b.Guard rails

Level 3 Control M easures

These are control options which should be considered last a s they do not control the source of the hazard but rely on human behaviour or supervision and are therefore less effective. They include;

d) Administrative Procedures: develop work methods or procedures toreduce the conditions of risk, for example: a.Written Safe Operating Proceduresb.Job rotation to restrict hours worked on difficult jobs.c.Staff trained in the correct operating procedures.

E)Use Personal Prot ective Equipment (PPE) and traini ng in its use:offer the lowest level of protection and should only be used as a last resort to deal with the hazard, where the hazard cannot be removed or reduced by any other means, for example:

a.Handling of chemical s – gloves, safety glasses , aprons.

b.Protecting eyes from flying particles.

c.Protecting feet – safety boots

Table1 .1 Report format for range control of risk

No.	Type of risk	Range level	Date	signature	Remark
1					
2					
3					

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test II Write true if the statement is correct and false if the statement is incorrect

1. Eliminate the Hazard is the most effective control measures eliminate the hazard and associated risks(4)
2. If a hazard cannot be eliminated then risks can be minimised by lower control measures.(3)

Note: Satisfactory rating - 7 points Unsatisfactory - below 9 points

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: _____

Test II

1. _____
2. _____

Information Sheet 2-	Conduct detailed analysis of feasible options and identification of resource requirements

2.1 Resource Requirements

A lack of technical skills or access to appropriate staff is a large source of project risk for complex, technical projects. Risk management on these projects requires careful assessment of needed skills and commitment of capable staff.

Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.

- **Resource requirement** may include:

✓ people
✓ finance
✓ equipment
✓ environment
✓ buildings/facilities
✓ technology
✓ information

Self-Check – 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I short answer

1. write resource requremment of risk (3)

Note: Satisfactory rating – 3 points Unsatisfactory – below 3 points

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: _____

Test I

1. _____
2. _____
3. _____

Information Sheet 3-	Select the most appropriate control and communicate to the supervisor

3.1 Eliminate the Hazard:

Hierarchy of hazard control is a system used in mining to minimize or eliminate exposure to hazards. It is a widely accepted system promoted by numerous safety organizations.

The most effective control measures eliminate the hazard and associated risks. This can be achieved through removing the hazard or selecting alternate products or equipment to eliminate the risk. If a hazard cannot be eliminated then risks can be minimised by lower control measures.

3.2 Communication

Effective corporate communication is a skill that everyone should master, especially for top-level managers and executives.

There are tip to communicate with Supervisor these are

1. Stay on the same page.
2. Think ahead and offer solutions to problems.
3. Offer suggestions that produce results.
4. Make your boss look good.
5. Communicate effectively at work.
6. Communicate on a personal level.
7. Ask for feedback or help.
8. Offer your help on projects.
9. Be accountable
10. Don’t complain behind their back.

- **These communication may include:**

✓ face to face

✓ in writing

✓ by telephone or by other electronic means

✓ formal

✓ informal

Self-Check – 3	Written test

Name…… ID……. Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I

Short answer

1. write at least four tips to communincate with supervisor (4)

Note: Satisfactory rating - 4points Unsatisfactory - below 4 points

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: _____

Test I

1. _____
2. _____

LG #45	LO #4- Contribute to the implementation of control

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Planning selected control
- Gaining authorization selected control
- Documenting and reviewing controls site with working instructions
- Applying Procedures to control recognized hazards
- Communicating information on the control and its implementation

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, **upon completion of this learning guide, you will be able to**:

- Plan selected control
- Gaining authorization selected control
- Document and reviewing controls with site working instructions
- Apply Procedures to control recognized hazards
- Communicate information on the control and its implementation

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. Perform “the Learning activity performance test”
7. If your performance is satisfactory proceed to the next learning guide,

Information Sheet 1	Planning selected control

1.1 Planning

Planning is the process by which the managers of an organisation set objectives, make an overall assessment of the future, and chart the courses of action with a view to achieving the organisational goals.

A project plan is a series of formal documents that define the execution and control stages of a project. The plan includes considerations for risk management, resource management and communications, while also addressing scope, cost and schedule baselines.

- **Planning follows that the planning process involves:**

(i) The determination of appropriate goals and objectives,

(ii) The specification of the risk control needed to reach the established objectives; and

(iii) The optimum period of time for achieving them.

Most organizations generate a template for the risk management plan, which consists of key content sections that will then be scaled or tailored to a specific project once the project is approved and enters planning.

- **Key elements of a good risk management plan** may include
  - ✓ Summary or overview
  - ✓ Approach and methodology
  - ✓ Roles and responsibilities
  - ✓ Budgeting and scheduling
  - ✓ Probability and impact matrix

Most plans will expand further by including sections on stakeholder tolerances, reporting formats, and methods to be used for tracking and monitoring of risks.

A good risk management plan will include all of the information that our stakeholders need to understand how risk will be planned, managed, dealt with, and documented throughout the life cycle of our projects. If anything in our protocols for dealing with risks were to change, this is where you would find the information to make sense of it.

S/N	Planned Activities	Months												Remark
		1	2	3	4	5	6	7	8	9	10	11	12	
1	Data Compilation													
2	Prform risk monitoring													
3	Monitor risk													
4	Monitor risk treatment													
5	Seek new risk													
6	Evaluate RM Process(quality, area which should be improved													
7	Risk review and monitoriing													
8	Reporting Writing													

Hint for one year planned control measure of risk

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Answer yhe following questions neatly and clearly

1. **What is planning(2)**
2. **Write at least three Key elements of a good risk management plan(3)**

Note: **Satisfactory rating – Above 3 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet – 2	Gaining authorization selected control

2.1 Gaining Authorization

Control environment factors include the **integrity**, ethical values and competence of the entity's people; management's philosophy and oper-ating style; the way management assigns authority and re-sponsibility, and organizes and develops its people; and the attention and direction provided by the board of directors.

- After gaining the authority the selected control:

✓ apply knowledge of the requirements, procedures and instructions for applying risk management processes

✓ implement requirements, procedures and techniques for the safe, effective and efficient completion of risk management processes

- **There six step process after gaining the authority:**

✓ Categorize the risk based on impact..

✓ Implement the controls

✓ .Assess the effectiveness of the risk controls.

✓ Authorize the selected risk control to reduce

✓ .Monitor the ongoing state of protection the risk controls are providing.

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Answer yhe following questions neatly and clearly

1. Write the step to follow after gaining the authority to control risk(3)

Note: **Satisfactory rating – Above 3 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet-3	Documenting and reviewing controls with site work instruction

3.1 Site Work instructions

are a set of written instructions that identify the health and safety issues that may arise from use of the machinery and equipment or be based on a task or process of mining. Workplace safety procedures are standardized processes that outline how to conduct tasks with minimal risk to people, materials, and work environments. The procedures include work-related tasks that address safety concerns, safety equipment, and work-area precautions.

A safe work procedure should identify:

1. the steps that are to be undertaken that pose risk
2. any control measures that have been built into these tasks
3. any training or qualification required to undertake the task
4. personal protective equipment to be worn
5. actions to be undertaken to reduce the risks in undertaking the task.

- Site working instructions may include:

✓ applicable legislation and code of practice relating to the industry, dangerous and hazardous goods, environmental protection and safety and health
✓ worksite safety management systems
✓ manufacturer's documentation and handbooks
✓ workplace operating procedures and policies
✓ materials safety data sheet
✓ emergency procedures
✓ safety alert

Self-Check -3	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Answer yhe following questions neatly and clearly

2. what is site working instruction(3)

Note: **Satisfactory rating – Above 3 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet-4	Applying Procedures to control recognized hazards

A hazard control program consists of all steps necessary to protect workers from exposure to a substance or system, the training and the procedures required to monitor worker exposure and their health to hazards such as chemicals, materials or substance, or other types of hazards such as noise and vibration. A written workplace hazard control program should outline which methods are being used to control the exposure and how these controls will be monitored for effectiveness.

Selecting an appropriate control is not always easy. It often involves doing a risk assessment to evaluate and prioritize the hazards and risks. In addition, both "normal" and any potential or unusual situations must be studied. Each program should be specially designed to suit the needs of the individual workplace. Hence, no two programs will be exactly alike.

Choosing a control method may involve:

- Evaluating and selecting temporary and permanent controls.
- Implementing temporary measures until permanent (engineering) controls can be put in place.
- Implementing permanent controls when reasonably practicable.

For example, in the case of a noise hazard, temporary measures might require workers to use hearing protection. Long term, permanent controls might use engineering methods to remove or isolate the noise source.

The main ways to control a hazard include:

- **Elimination (including substitution)**: remove the hazard from the workplace, or substitute (replace) hazardous materials or machines with less hazardous ones.
- **Engineering Controls**: includes designs or modifications to plants, equipment, ventilation systems, and processes that reduce the source of exposure.

- **Administrative Controls:** controls that alter the way the work is done, including timing of work, policies and other rules, and **work practices** such as standards and operating procedures (including training, housekeeping, and equipment maintenance, and personal hygiene practices).
- **Personal Protective Equipment**: equipment worn by individuals to reduce exposure such as contact with chemicals or exposure to noise.

Self-Check -4	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Answer yhe following questions neatly and clearly

1. Write The main ways to control a hazard (3)

Note: **Satisfactory rating – Above 3 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet-5	Communicating information on the control and its implementation

5.1 Implementation of risk control

The control measures that you put into operation will usually require changes to the way work is carried out due to new or modified equipment or processes, new or different chemicals or new personal protective equipment. In these situations, it is usually necessary to support the control measures with:

- **Work procedures** - Develop a safe work procedure that describes the task, identifies the hazards and documents how the task is to be performed to minimise the risks.
- Training, instruction and information - Train staff and students in the work procedure to ensure that they are able to perform the task safely. Training should require staff and students to demonstrate that they are competent in performing the task according to the procedure.

It is insufficient to simply give a staff member or site workers the procedure and ask them to acknowledge that they understand and are able to perform it. Training, instruction and information must be provided in a form that can be understood by all staff site workers. Information and instruction may also need to be provided to others who enter the workplace, such as contractors, volunteers or visitors.

Having identified the hazards in the company workplace, assessed their risks and reviewed the existing controls, all hazards must be managed before people are hurt, become ill or there is damage to plant, property or the environment. The management of risks in the workplace requires eliminating risks so far as reasonably practicable in the first instance. Where elimination is not possible, then risks should be minimised, so far as reasonably practicable. All hazards that have been assessed should be dealt with in order of priority. The most effective control option/s should be selected to eliminate or minimise risks.

- **Supervision** - The level of supervision required will depend on the level of risk and the experience of the staff / site workers involved. High levels of supervision are necessary where inexperienced staff are expected to follow new procedures or carry out difficult and critical tasks.

Information about suitable controls for many common hazards and risks can be obtained from:

- ✓ Compliance Codes, Codes of Practice and guidance material
- ✓ Manufacturers and suppliers of plant, chemicals, substances and equipment used in company workplace

Self-Check -5	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Answer yhe following questions neatly and clearly

2. What is the implementation of risk control (3)

Note: **Satisfactory rating – Above 3 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

LG #46	LO # 5 Review safety system documentation

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Monitoring and reviewing site working instructions
- Doing amendments to the site working instructions

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, **upon completion of this learning guide, you will be able to**:

- Monitor and reviewing site working instructions
- Do amendments to the site working instructions

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. Perform “the Learning activity performance test
7. If your performance is satisfactory proceed to the next learning guide,

Information Sheet 1	Monitoring and reviewing site working instructions

Monitoring is a continuous or periodic process which allows for regular feedback of systematically collected data or information. Monitoring and evaluation is an essential component of any adaptation planning and should not be neglected.

- Monitoring and evaluation (M&E) is critical to ensure the long-term success of Mining, plans and actions.
- Monitoring, evaluation and review design is critical to ensure that information is used to inform decision-making, make appropriate adjustments, and report to mining site manager, stakeholders and decision makers. Without a clear link between monitoring and decision-making, there is a risk that monitoring activities and resources will be seen as a drain on resources and discontinued in mining.
- Evaluation helps the compay to learn from what have been planned and what has been done. It helps with considering what changes need to be made to company planning approach, your plan and associated activities to get adaptation outcomes.
- Monitoring should include outputs, immediate and short-term outcomes, and longer term outcomes.
- Monitoring, evaluation and review is not the end of the adaptation planning cycle, it is a new beginning

Steps

1. Step 1: Identify Program Goals and Objectives.
2. Step 2: Define Indicators.
3. Step 3: Define **Data Collection** Methods and TImeline.
4. Step 4: Identify M&E Roles and Responsibilities.
5. Step 5: Create an Analysis Plan and Reporting Templates.
6. Step 6: Plan for Dissemination and Donor Reporting.

A site instruction is a formal instruction typically issued by the head or lead contractor with instructions and directives to other contractors or subcontractors.

It is a formal instruction sent from the head contractor that contains directives for contractors working on a project.

A review of a situation or system is its formal examination by people in authority. This is usually done in order to see whether it can be improved or corrected.

Steps to Review the work instruction

- ✓ Provide useful, constructive feedback.
- ✓ Talk about a range of elements, including customer service.
- ✓ Be detailed, specific, and honest.
- ✓ Leave out links and personal information.
- ✓ Keep it civil and friendly.
- ✓ Feel free to update your review if needed.
- ✓ Check you've got the right domain name or company

Hazard identification, risk assessment and control is an on-going process. Therefore, regularly review the effectiveness of your hazard assessment and control measures at least every 3 years. Make sure that you undertake a hazard and risk assessment when there is a change to the workplace including when work systems, tools, machinery or equipment change. Provide additional supervision when new employees with reduced skill levels or knowledge are introduced to the workplace. The effectiveness of control measures can be checked through regular reviews as well as consultation with workers. Maintaining records of the risk management process assists when undertaking subsequent reviews or risk assessments as it demonstrates decision making processes and informs how controls were intended to be implemented.

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Answer yhe following questions neatly and clearly

1. What is monitoring site work instruction (3)

Note: **Satisfactory rating – Above 3 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet 2	Doing amendments to the site working instructions

Amendments are changes made to the site working instruction of the project after approval from a review body has been given. If the company plan to make an amendment to his site working project, you will need to determine whether you need to notify the review bodies from whom you have received approvals.

An **amendment** to an existing approved Institutional Review Board (**IRB**) protocol is viewed as any change to what was previously approved during the period for which approval was given.

A principal investigator may not implement any changes to an approved study (including to the protocol or informed consent document) without prior IRB (institutional review board) review and approval, unless the change is necessary to eliminate apparent immediate hazards to the subjects.

- **The amendment has two parts**:
- ✓ **Coversheet** - used to identify the reason for the amendment and the IRB application sections to be changed.
- ✓ **Amendment workspace** - used to edit the application sections and study documentation to reflect the requested changes

A site instruction is a formal instruction typically issued by the head or lead contractor with instructions and directives to other contractors or subcontractors.

It is a formal instruction sent from the head contractor that contains directives for contractors working on a project.

Self-Check -5	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Answer yhe following questions neatly and clearly

8. What is site working instruction amendement means(3)

Note: **Satisfactory rating – Above 3 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

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