# (Mineral Resources Infrastructure Work)

# NTQF Level -I

# Learning Guide -38

Unit of Competence: - Carry out manual excavation

Module Title: - Carrying out manual excavation

LG Code: MIN MRI1 M11 LO1-LG-38

TTLM Code: MIN MRI1 TTLM 0819v1

## LO1: Prepare for work

| Instruction Sheet | Learning Guide38 |
|---|---|

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

- Site safety plan and organizational policies and procedures
- Identifying site conditions
- Accessing, interpreting and applying compliance documentation
- Applying safety requirements
- Project traffic management plan
- Identifying and implementing signage requirements
- Selecting appropriate tools and equipment
- Identifying and applying environmental protection requirements

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

- accesses, interpret and apply compliance documentation relevant to the work activity in according to organizational requirement
- obtain safety requirements from the site safety plan and organizational policies , procedures, and applied to the allotted task
- identify and obtain signage requirements from the project traffic management plan and implemented according to organizational policies and procedures organizational policies and procedures
- select appropriate tools, plant and equipment to carry out tasks consistent with the requirements of the job, checked for serviceability and rectified or report any faults
- identify environmental protection requirements from the project environmental management plan, and applied to the allotted task

**Learning Instructions:**

- Read the specific objectives of this Learning Guide.
- Follow the instructions described in number 3 to 7.
- Read the information written in the “Information Sheets 1 to 8”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
- Accomplish the “Self-check 1” in page 7, “Self-check 2” in page 10, “Self-check 3” in page 15, “Self-check 4” in page 21,“Self-check 5” in page 25, “Self-check 6” in page 30,“Self-check 7” in page 34,“Self-check 8” in page 40.

- Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1to 8).
- If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
- Submit your accomplished Self-check. This will form part of your training portfolio.

| | |
|---|---|
| **Information Sheet-1** | Site safety plan and organizational policies and procedures |

### 1.1 Concepts of site safety plan

**What is a Site Safety Plan?**

**A site safety plan** is a documented procedure that is designed to cover the hazards with a high chance of occurrence. Safety plans are custom made documents that can be amended and changed keeping in view the hazards of the work place. For example, in a workplace where there is a stacking of flammable liquids, the site safety plan will specifically cover the fire safety procedures. On a mine site, the site safety plan will include the procedures of Personal Protective Equipment, the fencing procedures, procedures regarding working at heights, etc.

The mine site safety also acts as a step by step guide to ensure you meet all parts of your obligations under the new Legislation to record the following:

•Identifying and managing hazards

•Reporting accidents and incidents

•Training or supervising employees

•Preparing for emergencies – first aid and rescue plans

•Providing opportunities for employees to be involved in safety procedures

### 1.2. Importance of safety site plan

A safety plan is a personalized, practical plan that can help you avoid dangerous situations and know the best way to react when you are in danger. Safety planning is an important aspect of how advocates at the hotline help callers protect themselves emotionally and physically in an abusive relationship.

### 1.3. Site safety plan basic elements:

- Policy or goals statement.
- List of responsible persons.
- Hazard identification.
- Hazard controls and safe practices.
- Emergency and accident response.
- Employee training and communication.
- Recordkeeping.

### 1.4 What site safety law requires

Workplaces under the jurisdiction are governed by your provincial legislation. The legislation places duties on owners, employers, workers, suppliers, the self-employed and contractors,

to establish and maintain safe and healthy working conditions. The legislation is administered by your provincial legislation. The officials are responsible for monitoring compliance.

### 1.4.1. Duties of your employer

Your employer is responsible for providing you with safe and healthy working Conditions. This includes a duty to protect you from violence, discrimination and Harassment. You must cooperate with your employer in making your workplace safe and healthy.

### 1.4.2. Responsibilities of the employee

You must also comply with the legislation. You have responsibilities to:

- ✓ Protect your own health and safety and that of your co-workers;
- ✓ Not initiate or participate in the harassment of another worker; and
- ✓ Co-operate with your supervisor and anyone else with duties under the legislation.

## 1.5 Organizational policies and procedures in mine industry

**Company policies and procedures** are in place to protect the rights of workers as well as the business interests of employers. Depending on the needs of the organization, various policies and procedures establish rules regarding employee conduct, attendance, dress code, privacy and other areas related to the terms and conditions of employment. The following are the common organizational policies

**a. Employee Conduct Policies**

An employee conduct policy establishes the duties and responsibilities each employee must adhere to as a condition of employment. Conduct policies are in place as a guideline for appropriate employee behavior, and they outline things such as proper dress code, workplace safety procedures, harassment policies and policies regarding computer and Internet usage. Such policies also outline the procedures employers may utilize to discipline inappropriate behavior, including warnings or employee termination

**b. Equal Opportunity Policies**

Equal opportunity laws are rules that promote fair treatment in the workplace. Most organizations implement equal opportunity policies – anti-discrimination and affirmative action policies, for example – to encourage unprejudiced behavior within the workplace. These policies discourage inappropriate behavior from employees, supervisors and independent contractors in regard to the race, gender, sexual orientation or religious and cultural beliefs of another person within the organization.

**c. Attendance and Time off Policies**

Attendance policies set rules and guidelines surrounding employee adherence to work schedules. Attendance policies define how employees may schedule time off or notify

superiors of an absence or late arrival. This policy also sets forth the consequences for failing to adhere to a schedule. For example, employers may allow only a certain number of absences within a specified time frame. The attendance policy discusses the disciplinary action employees face if they miss more days than the company allows.

**d. Substance Abuse Policies**

Many companies have substance abuse policies that prohibit the use of drugs, alcohol and tobacco products during work hours, on company property or during company functions. These policies often outline smoking procedures employees must follow if allowed to smoke on business premises. Substance abuse policies also discuss the testing procedures for suspected drug and alcohol abuse.

**e. Workplace Security Policies**

Policies on security are in place to protect not only the people in an organization, but the physical and intellectual property as well. Policies may cover entrance to a facility, such as the use of ID cards and the procedures for signing in a guest. Equipment such as a company laptop or smartphone may need to be signed out.

The most important characteristic of good written policies and procedures is that they are visible to and clearly understood by the entire organization. To this end, policies and procedures should be established, followed, monitored, and reviewed. This process is one that repeats itself constantly throughout the grant cycle and the life of your organization.

**Examples of Policies and Procedures in manual excavation**

- Authorization of transactions
- Payroll procedures
- Cash receipts procedures
- Procurement policies
- Travel regulations
- Financial reporting
- Budgeting
- Record Retention
- Conflict of Interest
- Timekeeping

| Self-Check -1 | Written Test |
|---|---|

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

1._____ is a documented procedure that is designed to cover the hazards with a high chance of occurrence. (2 pts.)

**A.** Safety requirements **C.** site safety plan

**B.** Site conditions **D.** site hazard

2._____ defines how employees may schedule time off or notify superiors of an absence or late arrival. (2pts)

**A.** Abuse policies **C.** Security Policies

**B.** Attendance policies **D.** Equal Opportunity Policies

3. Why is a safety plan important in mining? How do you develop a site safety plan? (2 pts.)

4. List out site safety plan basic elements. (2 pts.)

5. List at least four common organizational policies? (2pts.)

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

**Answer Sheet**

Score = _____

Rating: _____

Name: _____ Date: _____

**Short Answer Questions**

| Information Sheet-2 | Identify site conditions |
|---|---|

## 2.1 Concepts of site conditions

**Site Conditions** means any physical conditions on, under or over the surface of, or at or in the vicinity of, the Site including.

## 2.2 Types of site conditions

The following are the main types of site conditions in mining area.

**Dry:** Are site conditions free or relatively free from a liquid and especially water**.**

**Wet:** is consisting of, containing, covered with, or soaked with liquid (such as water).

**Mud**: is soft, sticky, matter resulting from the mixing of earth and water.

**Dust:** small dry particles: very small dry particles of a substance such as sand or coal, either in the form of a deposit or a cloud.

**Topography:** Topography refers to the detailed written representation of a place or area including lakes, major rivers, mountains, valleys, latitudes, and roads.

## 2.3 Main steps of site condition assessment will be

a) To record the damage if any, and find out the causes for hazard

b) To assess the extent of distress and to estimate the residual strengths of structural components and the system including the foundation.

c) To plan the rehabilitation and retrofitting/strengthening of the building.

## 2.4 Methodology of Condition Assessment

Condition assessment and evaluation is generally carried out in two levels:

(i) Preliminary and

(ii) Detailed

### i) Rapid (Visual) Investigation

There are mainly three components and steps:

• Collection of information and details about the mine, utilization, and maintenance in the past.

• Visual inspection of condition at site and recording details of distress

• Evaluation of safety against the provisions in excavation codes or specified performance criteria**.**

### ii) *Details in visual Investigation*

The main purpose of visual investigation is to observe and note down all the items of distress or design deficiency and their locations, supported by sketches and drawings. The visual inspection includes:

• Verification of the accuracy of the original drawings or determination of basic excavation information, if no drawings are available.

• Identification of major alterations not shown on the original mine documents.

• Identification of visible structural damage, such as bench cracking or sapling, and observations on quality of construction

• Identification of potential non-structural falling hazards, including benches, partitions, curtain Walls, parapets, fixtures, and other non-structural building elements.

• Observations on the condition of soil.

| Self-Check -2 | Written Test |
|---|---|

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

1. What are mine site conditions? List types of mine site conditions. **(3 pts.)**
2. What are the main steps of site conditions assessment? **(3pts.)**
3. Discus on methodology of mine site condition assessment. **(4 pts.)**

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

**Answer Sheet**

Score = _____

Rating: _____

Name: _____ Date: _____

**Short Answer Questions**

| Information Sheet-3 | Accessing, interpreting and applying compliance documentation |
|---|---|

### 3.1. Basic concept on Compliance documentation

**Compliance documentation** is 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.

Compliance documents are documents that must be read and followed and in some cases completed by you. Failing to follow and work correctly with compliance documents may lead you to lose your job. In workplaces where there are inherent dangers around you, if you do not follow the rules you can expect to be looking for another line of work!

### 3.2. Legislation

Legislation is the formal rules and laws set by governments.

The following regulations, procedures, standards and safety considerations may apply to planning and organize your work activities:

- Mining Act and Regulations
- Environmental Protection Act
- Equal Employment Opportunity and Disability Discrimination legislation
- Employment and workplace relations legislation
- Duty of care
- Code of Practice
- Occupational Health and Safety legislation
- Ethiopian Standards
- Manufacturer's specifications and recommendations
- Site specific regulations and procedures

**What is the difference between an Act and a Regulation?**

An Act is passed by Parliament and provides the ***framework*** which deals with administration, management, inspection, areas of responsibility, duties and penalties, i.e. for Ministers, Inspectors, and Mine Managers. Acts are LAW.

Regulations are an Act passed by Parliament and details the specific elements, such as regulations concerning the use and operation of mobile lighting plant, the levels of a specific chemical that can be found in the air within a mine, etc. They are the ***minimum standard*** to be complied with. Regulations are also law.

### 3.3. Common law

Common law is the set of laws that are formed, not from government (i.e. statute law), but from past judgments in courts and judicial decisions. The major common law that affects us all is that about individual obligation.

Every person owes an obligation. To discharge their obligation, each person must act in a manner, which shows consideration to other people and property, i.e. to act in a manner, which a reasonable person (with such training/and or experience) would consider fair, just and safe. If you act negligently in an inadvertent manner, i.e. you do not think about how you act or the consequences, you will be liable. If you act negligently in a reckless or willful manner, i.e. you deliberately decide to act in a manner, which is likely or calculated to cause damage/loss, you will be liable, and may be charged with a crime in certain circumstances (insurance does not cover you for such acts).

### 3.4. Duties of workers

Through the awards, regulations and other forms of law broad expectations or duties of workers have been set. Any worker however regardless of the industry they work in or where they are working, has a common set of duties:

• Take reasonable care for his or her own health and safety.

• Take reasonable care that his or her acts or omissions do not adversely affect the health and safety of other persons.

• Comply so far as the worker is reasonably able, with any reasonable instruction that is given by the person conducting the business or undertaking to allow the person to comply with the relevant legislation.

• Co-operate with any reasonable policy or procedure of the person conducting the business or undertaking relating to health or safety at the workplace that has been notified to workers.

• Identify and report risks and hazards.

• Use or wear appropriate personal protective equipment.

• Not intentionally misuse or cause damage to equipment.

#### 3.4.1. Being accountable

Accountability is defined as *“being responsible to somebody or for something”.*

In a work sense, accountability is about being true to your word and meeting all of your responsibilities. It is also about being true to yourself and your personal expectations of doing a good job. Accountability is an individual value. Real accountability cannot be forced; it must be voluntary. Your accountability is really up to you, but you will be judged by other workers and the bosses on how you demonstrate your accountability.

### 3.4.2. *Honesty*

Be honest with yourself about your reasons and motivations for your actions. Be clear about the consequences and accept them graciously.

### 3.4.3. *Responsibility*

Once you have gotten a handle on being accountable to yourself, begin accepting responsibility when and where it is deserved. At the same time, do not be afraid to assign responsibility if it truly belongs to someone else. It can be hard to take the high road and be accountable for your actions, particularly if others around you don't choose the same path. It is not your place to preach or judge others, but you should act assertively and ask that they take responsibility for their actions.

### 3.4.4. *Assertiveness*

Assertiveness is a word we tend to use without really understanding what it means. We sometimes picture assertive people as being inconsiderate and very demanding. Rather, assertive people express their feelings, needs, and opinions in a forthright manner. However, they are not abrasive; that is the hallmark of the aggressive person.

Assertiveness is behavior that allows a person to express honest feelings in a straightforward way and to exercise personal rights without changing the rights of others. Assertive people feel positive about themselves and others. They are willing to give others a chance to be reasonable before using less positive tactics. They want to openly discuss problems based on facts and needs. Assertion is based on respect for you and respect for the other person.

## 3.5. Work instructions

When planning any work you must take into account your duty of care obligations and the policy and procedures of your workplace. You must make sure your conduct is safe and does not place others at risk. The task requirements will be outlined in your work instructions for that job. Generally these instructions will be provided by your immediate supervisor, the team leader, site manager or other person in direct authority.

## 3.6. Forms of instruction

Work instructions can be received by you or your work team in several different ways. The most common ways of receiving work instructions in a mining workplace are:

### *1. Written documentation*

A written document means a document with text that provides information on an official work related matter. It may include reports, memos, letters, manuals, service standards and directives.

### 2. *Verbal instructions*

Verbal instructions are the instructions, directions and orders that are given to you through voice, i.e. the boss tells you what to do!

### 3. *Team meetings*

A team meeting is when the members of your work team are gathered together to receive instructions about the work tasks, report back on the team's progress on various jobs and to learn about what is happening in the immediate future on the work site.

| Self-Check -3 | Written Test |
|---|---|

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

1. _____ are the instructions, directions and orders that are given to you through voice, i.e. the boss tells you what to do! (2pts)
2. What are the regulations, procedures, standards and safety considerations apply to planning and organize any work activities: (3 pts.)
3. What are the most common ways of receiving work instructions in a mining workplace are? (3pts.)
4. List common duties of mine workers. (4 pts.)

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

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

Answer Sheet

Name: _____ Date: _____

| Information Sheet-4 | Apply safety requirements |
|---|---|

### 4.1. Introduction

The **safety requirements** are those requirements that are defined for the purpose of risk reduction. Like any other requirements, they may at first be specified at a high level, for example, simply as the need for the reduction of a given risk. Excavation is among the most hazardous mining operations. Therefore in mining excavation safety requirements are important to consider.

### 4.2. The Importance of Mine Safety

Safety is an essential component of any healthy workplace. Mines in particular are hazardous environments with a greater potential for large-scale environmental damage and loss of life than for many other workspaces, thus making mine safety an ever-present concern. As mines increase in size and depth and mining companies become larger operations that include more workers, safety becomes a new challenge that has been met by the development of specialized practices and equipment designed specifically to provide miners with the warning and protection they need to prevent or minimize accidents .Generally the importance of safety in mine include prevent any loss of life, injury and health problems of mine workers.


*Fig 4.1. A). wear safety helmets B. Excavation without helmet*

### 4.3. Hazards in the mine working environment and their safety requirements

In the working environment of a surface mine airborne contaminants (such as rock dust and fumes), excessive noise, vibration, heat stress and ergonomic problems can create health risks to mineworkers who are subject to frequent and prolonged exposure to them.

#### A. Dust

Airborne contaminants, such as rock dust, are mainly produced during drilling operations, mineral getting, loading, crushing of rock or ore, and blasting.

Dust should be controlled or suppressed by:

- Using wet drilling techniques.
- Using water sprays during mineral getting, loading, crushing

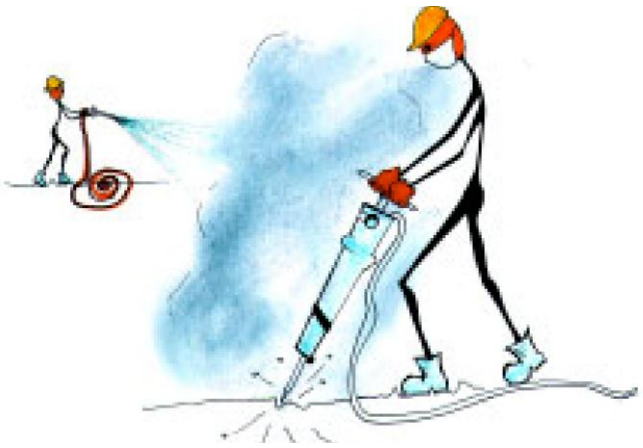


*Fig 4.2. Use water to suppress dust and/or wear a dust mask.*

**B. Harmful fumes**

Fumes, produced during shot-firing operations contain toxic gases (such as sulphur dioxide, nitrous oxide, nitric oxide, etc.) which, when inhaled, can lead to serious health damage. Mineworkers should not approach a working face after shot-firing until the dust and gaseous products of the blast have completely dissipated.

***C. Noise***

Repeated or prolonged exposure to excessive noise levels will lead to hearing impairment. Potential sources of noise emissions include compressors, drilling machines, pick-hammers or other mechanical equipment used at a mine.

*4.3. Hearing protection*

***D. Vibration***

Workers operating hand-held machinery, especially pneumatic rock drills and pick-hammers — even for one hour a day — can suffer from the effects of vibration in their hands and arms.

**Prevention and control of Vibration White Finger**

• Avoid long periods using equipment. Work in short bursts.

• Use modern, vibration-dampened equipment.

• Repair or replace old equipment or fit anti-vibration handles.

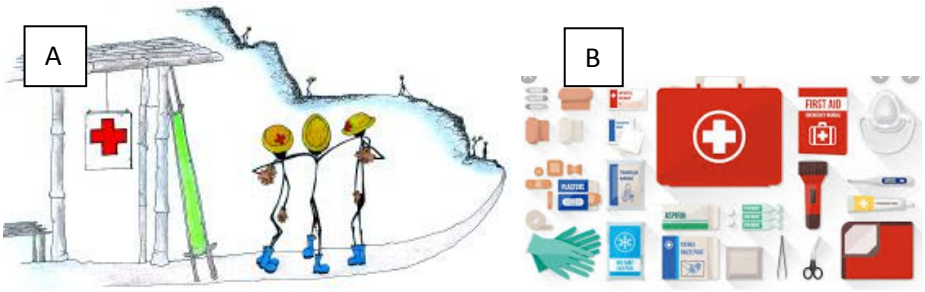
• Grip handles as lightly as possible.

• Support heavy tools so that a lighter grip can be used.

• Maintain vibrating tools to minimize vibration levels.

### 4.4. First aid

Workers and supervisors should be able to respond quickly to incidents and accidents and provide basic first aid and treatment to injure d persons. Rapid first-aid treatment can prevent further serious health damage or even loss of life to injured persons.




4.5. *Have people trained in first aid B Full first aid equipment's*.

The minimum ***equipment*** re q u i red to ensure adequate first-aid treatment should include:

• a stretcher for transporting persons unable to walk;

• a blanket for persons in shock;

• Sufficient bandages and sterile dressings for open wounds on limbs, body and head;

• Splints for fractures of limbs;

• Disinfectants;

• Any other first-aid material that may be required due to the nature of work and recommended by a competent physician.

### 4.6. Personal protective equipment

The mine operator should provide, free of charge, the personal protective equipment that is to be worn when hazards cannot be eliminated — and ensure that it is worn properly and maintained in good condition.

**The basic personal protective equipment should be:**

1. **Safety helmet (hard hat)** where falling objects might create a hazard**.**
2. **Protective gloves** when handling materials or performing work which might cause injury to the hands.
3. **Suitable protective footwear** (e.g. safety shoes or rubber boots) where there is a danger of slipping or of injury to the feet.

*4.6. Person with safety shoes and helmet, protective gloves*

4. **Hearing protection** where excessive noise levels are produced (e.g. where compressors, drilling machines or pick-hammers are used).

*4.7. Person with safety helmet and protective gloves*

5. ***Dust mask*** where excessive airborne dust is produced (e.g. during drilling or rock-breaking).

*4.8. Person with Dust masks, safety shoes and helmet*

6. **Safety glasses/goggles** where there is a danger from flying particles that may cause injury to the eyes (e.g. where hard rock is to be broken).

*4.9. Person with Safety glasses/goggles*

**Other personal protection may also be required, such as:**

• Closely-fitting clothes when working with or around moving machinery or equipment;

• Safety belts and lines where there is a danger of falling.

| Self-Check -4 | Written Test |
|---|---|

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

1. What is personal safety in the mining? Why is personal safety important? How do you maintain personal safety in mining?(6pts)
2. What are the Personal protective equipment and their uses? (3 pts.)
3. What are the tools in first aid box?(3pts)

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

**Answer Sheet**

Score = _____

Rating: _____

Name: _____ Date: _____

**Short Answer Questions**

| Information Sheet-5 | Traffic Management |
|---|---|

### a. Basic concept Traffic Management

**Traffic management** at the work site is essential to control traffic hazards and ensure safe work. The purpose of traffic management is to move people and vehicles through or around the work site as safely and efficiently as possible.

### b. Primary aims of Traffic Management

A Traffic Management Plan is a key workplace document that has legal standing. As such it is critical that the structure and content of the Plan is sufficient to explain the potential hazards, the assessed risks and the proposed treatments for the proposed work activities and work site. The TMP should include all of the following.

The TMP must clearly state the objectives of the plan.

Primary objectives will include requirements to ensure the safety and health of work personnel, the public and those who will be impacted by the work and to ensure that road users are not inconvenienced and the road network be kept at a satisfactory level of performance.

Traffic Management around work zones strives to achieve two different goals:

1. The safety of workers in the work zone
2. The safety and convenience of road users

## 5.3. Hazards associated with working near traffic include:

- Close proximity of workers to road traffic
- High traffic volumes
- Motorists approaching at high speed and/or with limited visibility of the work
- Mobile plant and equipment on site
- Reduced visibility due to shade, light and glare throughout the day
- Parked vehicles, plant and equipment

*Fig 5.1Traffic Controller in Front of Work Area*

The site or project traffic management plan assists personnel to manage risks and documents information about the control measures.

The traffic management plan may include details of:

- Required pedestrian and vehicle movements during the work
- Interaction between mobile plant, vehicles and pedestrians
- Traffic controls, including barricades, signage and walkways
- Roles and responsibilities of traffic management personnel
- Instructions for traffic control
- Emergency procedures

***NOTE*** Refer to your site procedures and the traffic management plan for the controls that must be applied.

A contractor may be hired to manage traffic and implement the required controls. Ensure that you understand the traffic control responsibilities and authorities for your site.

**Your role in traffic management includes the following.**

• Wear appropriate high visibility clothing.

• Coordinate with all personnel involved.

• Identify and obtain the signage requirements from the site traffic management plan.

• Erect signs, barricades and other traffic controls according to your site procedures and the traffic management plan.

• Maintain adequate separation between traffic and the work area.

• Obey site speed limits, and observe the requirements for overtaking and giving way on site.

• Use vehicle mounted warning signs and lights to increase work vehicle visibility.

• Use shadow vehicles and/or truck mounted signals to alert oncoming traffic of work activities.

• Refer to the police traffic coordinators for road traffic enforcement arrangements.

• Observe the site parking regulations. Where possible make sure that work vehicles are parked in locations away from passing traffic, for example on side or service roads, in breakdown bays, or behind guard rails. Only the driver of a parked vehicle should remain in the vehicle, and then only if the vehicle is performing traffic control.

**NOTE**

You must obtain approval from the relevant authority before working on or adjacent to a public road.


*Fig 5.2 Cone Barrier and barrier fence*

### 4.4. Access, interpret and apply traffic management documentation

A traffic management plan is a plan detailing work to be undertaken and describing its impact on the general area, especially its impact on public transport and passengers, cyclists, pedestrians, motorists and commercial operations. It also describes how these impacts are being addressed.

| Self-Check -5 | Written Test |
|---|---|

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

1. What is the of traffic management in an excavation area?
2. What are the Hazards associated with working near traffic?
3. What is your role as technician in traffic management?

| Information Sheet-6 | Identifying and implementing signage requirements |
|---|---|

## 6.1. What is Signage?

A sign displays a distinct message about how to protect personnel from exposure to hazards. A sign displaying a safety message carries the same authority as a direct instruction from your supervisor. Failure to obey a sign can result in disciplinary action, injury or death.

**The following table displays a sample of each type of sign along with a brief description.**

| Description | Example | Description | Example |
|---|---|---|---|
| **Mandatory Signs**<br>Indicate an instruction that must be carried out. |  | **Prohibitory Signs**<br>Indicate an action or activity that is not permitted. |  |
| **Warning Signs**<br>Indicate a hazard or hazardous condition that is not likely to be life threatening. |  | **Danger Signs**<br>Warn of a hazard or hazardous condition that is likely to be life threatening. |  |

| Description | Example | Description | Example |
|---|---|---|---|
| **Emergency Information Signs**<br>Indicate the location of, or direction to, emergency related facilities such as exits, safety equipment or first aid facilities. |  | **Fire Related Signs**<br>Indicate the location of fire alarms and fire fighting equipment and facilities. |  |
| **Traffic Signs**<br>Indicate speed limits, road conditions and road rules. |  | **Hazard and barrier tape** temporarily identifies safety hazards, or defines an area into which you should not enter.<br>**Demarcation tape** is used to permanently define the boundaries of areas |  |

*Fig 6.1 type of sign along with a brief description.*

**NOTE**

Signs are placed for your protection. Always keep signs clean and in good condition.

Do not remove a sign unless you are authorized to do so

***Posting warning signs and barriers***

A surface mine often consists of deep trenches or large holes. There is a high risk that a mineworker or member of the public could fall in. Such workings should be surrounded by a secure fence or otherwise securely barricaded. Suitable warning signs to forbid unauthorized entry and subsequent fall of any person should be posted.


*Fig 6.2 Fence pits; post warnings.*

Ground conditions or any other dangerous condition in the mine that creates a hazard to persons should be corrected before other work or travel is permitted in the affected area. Until corrective work is completed a warning sign against entry should be posted. When left unattended, a barrier should be installed to prevent unauthorized entry.

*Fig 6.3 Isolate unstable ground until it is fixed*

**6.2. Ways to Meet OSHA Requirements for Safety Signage**

Safety signs can play a vital role in ensuring a safe workplace. Employers who implement effective, clear visual communication may enjoy fewer accidents and injuries, increased efficiency, and safe behavior throughout their facility.

How can employers realize these benefits and comply with federal standards for visual communication? Here are five ways to meet occupational safety and health administration requirements for safety signage.

### 6.3. Understand OSHA Requirements for Signage

OSHA's guideline for signs and tags that identify hazards outlines design requirements and specifies when safety signs must be used.

**Singe sign designs, including:**

- Standard sign and label colors
- Signal words (such as "Danger" and "Warning")
- Letter style and size
- Sign and label placement

### 6.4. Recognize the Different Types of Safety Signs

There three primary severity classifications for safety signs. They are danger signs, warning signs, and caution signs; each relates directly to the severity of hazards present (or potentially present).

- **Danger:** Danger signs signal the most serious hazards, where special precautions must be taken. The "DANGER" signal word is printed in white letters on a red background and is preceded by the safety alert symbol, which looks like an exclamation point inside a triangle. This type of sign indicates that death or serious injury is almost certain to occur if the hazard is not avoided.
- **Warning:** This sign describes a hazard that may result in death or serious injury, but where the overall risk is not severe enough to need a danger sign. A safety alert symbol precedes the "WARNING" signal word, which is printed in black on an orange background.
- **Caution:** The hazards described on a caution sign may result in minor or moderate injuries if not avoided. These typically caution against unsafe practices. On caution signs, the "CAUTION" signal word is printed in black on a yellow background header and is preceded by the safety alert symbol.


*Fig 6.4.Safety Signs of danger, warning and caution*

### 6.5. Know the Different Types of Safety Signage

Safety signs and labels should be posted whenever hazards may be present throughout a facility. Yet other types of signs can help employees stay safe and productive without pointing out specific hazards. They include:

- **Notice:** Use notice signs to deliver information about a machine, building, area, or equipment. These signs outline procedures, maintenance information, instructions, rules, and directions unrelated to personal injuries.
- **General safety signs:** These offer broad safety-related messages, typically relating to health, medical equipment, sanitation, first aid, housekeeping, and suggested general safety measures.
- **Admittance:** Admittance signs alert and explain the dangers and consequences associated with entering a restricted area.
- **Fire safety:** Fire safety signs point out emergency firefighting equipment and fire exits.
- **Non-hazard signs:** These communicate general safety facility information, such as way finding directions procedures, usually through simple text and clear symbols. These should be never be used to communicate hazards, risks, or dangers; they are not technically safety signs but nevertheless promote a safer workplace.

### 6.6. The Importance of Safety Signs

Safety Signs are crucial in any work environment. The primary importance of displaying Safety Signs is to **prevent injury** and ensure staff and visitors are well aware of the possible dangers and hazards ahead in certain situations and/or environments. Without signs, many employees would lack the necessary direction in times of crisis, and employers might find themselves in significant legal difficulties if any accidents were to arise as a result.

| Self-Check -6 | Written Test |
|---|---|

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

1. What are the different types of safety signs in mine area? Discus with their respective symbols.**(4pts)**
2. Why safety signs are important? **(4pts)**

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

**Answer Sheet**

Score = _____

Rating: _____

Name: _____ Date: _____

**Short Answer Questions**

| Information Sheet-7 | Selecting appropriate tools and equipment |
|---|---|

## 7.1 Introduction on Tools and equipment used in manual excavation

There are different types of excavation tools and equipment used in mine area. Excavation of soil is necessary in mine point of view and it should be done by hand tools based on the area of the land or depth of excavation. Now days, for the soil excavation there are so many equipment's are there and these are classified into two types.

1. **Hand tools**
2. **Machineries**

Form this two equipment's hand tool are the mail tools used for manual excavation. The tools come under this category are explained below. Description and function of selected tools that you may encounter on an excavation.

1. **Spade**

Spade is a tool which consists metal plate having sharp edges; the plate is attached to long handle which is generally made up of wood. Because of its sharp edges the soil can be dig easily. The metal plate having less curvature in the spade so, we cannot lift the soil by spade.

*Fig 7.1.Spade*

How is it used?

- ✓ Spades are useful for cutting and digging heavy soil, digging straight-sided, flat-bottomed trenches, or removing a layer of sod.

2. **Shovel**

Shovel is tool which is used for the purpose of lifting of excavated soil. It is also similar to spade the difference between spade and shovel is the difference in leading edge. The curvature of metal plate of shovel is generally higher when compared to spade so we can hold the soil easily and lifted it. Shovel can also be used for digging purpose in case of soft soils, sand etc.

*Fig 7.2 Shovel*

**How is it used?**

- ✓ Shovels are used for digging and lifting loose soil or other substances.
- ✓ Useful tools to be used if you have a large amount of lightweight material to move are a wide scoop shovel**.**

**3. Pick axes and mattocks**

Pick axe consists hard spike attached perpendicular to handle. They are used for excavating small trenches in soil. Pick axe can cut the soil even if the soil is of hard type. The metal spike is pointed on one side and wide blade is provided on the other side.

*Fig 7.3.Pick axes and mattocks*

**How is it used?**

- ✓ Picks and mattocks are used to work soil that is hard, rocky or root filled.
- ✓ A pick has a pointed tip on one end and a chisel like tip on the other.
- ✓ Mattocks are used for loosening soil that is root filled.
- ✓ Mattocks have an axe-head on one side and a flat hoe like head on the other.

**4. Hoe**

Hoe is an excavating tool which consist a metal plate attached to a long handle with acute angle. The plate having sharp edge is used to excavate the soil. For small work of excavation it is widely preferred tool. Sometimes metal plate is replaced by fork type plate.

*Fig 7.4. Hoe*

**How is it used?**

- ✓ There are many types of hoe available.
- ✓ Triangular shaped hoes are good for breaking into hardened soil, weeding, and cultivation in tight spots.
- ✓ The blade of the hoe rests on the ground and is moved back and forth to remove weeds just below the soil surface.

**5. Trowel**

Trowel is hand sized tool which is generally used to dig the small trenches in soil or to remove the shallow roots in soil.

*Fig7.5.Trowel*

| Self-Check -7 | Written Test |
|---|---|

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

1. This of the following hand tools is not used in manual excavation (3 pts.)

   A. Hoes C. Saws

   B. Shovels D. Pick axes

2. _____is hand sized tool which is generally used to dig the small trenches in soil or to remove the shallow roots in soil. (2 pts.)

3. _____ an excavating tool which consist a metal plate attached to a long handle with acute angle

4. What is the difference between Pick axes and mattocks? (2 pts.)

5. There are different types of excavation tools and equipment used in mine area. List the tools and discus their respective functions. (5 pts.)

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

**Answer Sheet**

Score = _____

Rating: _____

Name: _____ Date: _____

**Short Answer Questions**

| Information Sheet-8 | Identifying and applying environmental protection requirements |
|---|---|

## 8.1. What is environment?

Environment is everything that is around us. It can be living or non-living things. It includes physical, chemical and other natural forces. It is the natural world, as a whole or in a particular geographical area, especially as affected by human activity.


*Fig 8.1. Our environment*

## 8.2. Environmental protection in mine area

**The following are some of the methods used to protect our environment in mine area**

1. Reduce inputs. The mining industry uses a large amount of water and land in their operations.
2. Reduce mineral consumption.
3. Proper waste disposal. ...
4. Improving the manufacturing process. ...
5. Introduce legislation and regulations.
6. Improve environmental performance at mines.
7. Close and reclaim shut-down mines. ...
8. Replenishing the environment. ...


*Fig 8.2. Land revagtion after mining*

## 8.3. Environmental problems in mines and their management plan

The environmental management plan contains all aspects of a project's environmental management, and should be prepared by the contractor before work commences on any mining project.

***Objective***

To develop an environmental management plan to reduce the adverse impact of mine activities on the environment.

***Suggested measures***

- An environmental management system should be in place, as a pre-requisite to preparing an environmental management plan.
- Prepare an environmental control plan for defined segments of the site for large sites, or a whole-of-site plan for smaller sites.
- The plan should implement the risk management action plan, include detailed specifications on site-specific controls and include a rehabilitation program in the plan.
- Base the measures in the plan on best practice.
- Update the plan to meet new risks or where inspections, monitoring or audit reveal that measures are ineffective.
- Update the plan to achieve ongoing improvement.

### 8.3.1. Land disturbance

Large projects usually involve extensive land disturbance, involving removing vegetation and reshaping topography. Such activities make the soil vulnerable to erosion. Soil removed by erosion may become airborne and create a dust problem or be carried by water into natural waterways and pollute them. Measures to address the impact of land disturbance on the environment should be included in the planning and design phase of the project, before any land is cleared.


Fig 8.3. Land disturbance mitigation measures

### 8.3.2. Erosion

When considering land disturbance and its consequences, priority should be given to preventative rather than treatment measures. To develop effective erosion controls it is necessary to obtain information on the erosion potential of the site where soil disturbance is planned. Erosion potential is determined by the erodibility of the soil (type and structure), vegetative cover, topography, climate (rainfall and wind), and the nature of land-clearing. Erosion potential will also be affected by the type, nature and intensity of earthwork.

**The following measures should be taken to minimize erosion:**

• Keep land clearance to a minimum.

• Avoid wherever possible clearing areas of highly erodible soils and steep slopes which are prone to water and wind erosion.

• Revegetate and mulch progressively as each section of works is completed. The interval between clearing and revegetation should be kept to an absolute minimum.

• Coordinate work schedules, if more than one contractor is working on a site, so that there are no delays in construction activities resulting in disturbed land remaining unstabilised.

### 8.3.3. Management of stockpiles and batters

**A stockpile** is a pile or storage location for bulk materials, forming part of the bulk material handling process.

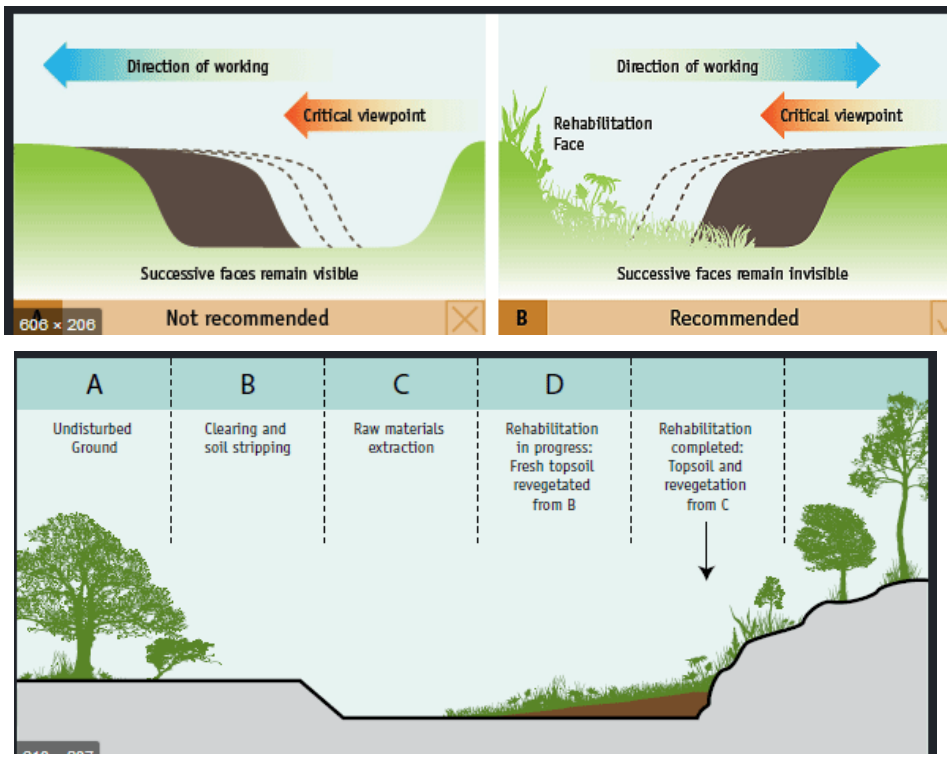
*8.4. Stockpile*

**Objective**

To manage soil stockpiles so that dust and sediment in run-off are minimized.

***Suggested measures***

- ✓ Minimize the number of stockpiles, and the area and the time stockpiles are exposed.
- ✓ Keep topsoil and underburned stockpiles separate.
- ✓ Locate stockpiles away from drainage lines, at least 10 metres away from natural waterways and where they will be least susceptible to wind erosion.
- ✓ Ensure that stockpiles and batters are designed with slopes no greater than 2:1 (horizontal/vertical).
- ✓ Stabilize stockpiles and batters that will remain bare for more than 28 days by covering with mulch or anchored fabrics or seeding with sterile grass.
- ✓ Establish sediment controls around unstabilised stockpiles and batters.
- ✓ Suppress dust on stockpiles and batters, as circumstances demand.




*8.5. Suggested measures Stockpile*

### 8.3.4. Noise and vibration

*Objective*

To ensure nuisance from noise and vibration does not occur.

***Suggested measures***

- ✓ Fit and maintain appropriate mufflers on earth-moving and other vehicles on the site.
- ✓ Enclose noisy equipment.
- ✓ Provide noise attenuation screens, where appropriate.
- ✓ Where an activity is likely to cause a noise nuisance to nearby residents, restrict operating hours to between 7 am and 6 pm weekdays and 7 am to 1 pm Saturday, except where, for practical reasons, the activity is unavoidable.
- ✓ Noise should not be above background levels inside any adjacent residence between 10 pm and 7 am.
- ✓ Advise local residents when unavoidable out-of-hours work will occur.
- ✓ Schedule deliveries to the site so that disruption to local amenity and traffic are minimized.
- ✓ Conduct a study on the impact of ground vibration from construction activities, where these operations occur within 50 metres of a building and take appropriate action.
- ✓ Minimize air vibrations.

### 8.3.5. Dust control

*Objective*

To ensure there is no health risk or loss of amenity due to emission of dust to the environment.

**Suggested measures**

- Implement a dust prevention strategy, developed at the excavation planning stage.
- Take dust suppression measures, such as promptly watering exposed areas when visible dust is observed.
- Pave and water haul roads
- Install wind fences wherever appropriate

*Fig 8.6. Suggested measures of Dust control*

### 8.3.5. Waste minimization

***Objective***

To minimize the waste load discharged to the environment.

***Suggested measures***

- ✓ Carry out a waste minimization assessment which examines opportunities for waste avoidance reduction, reuse and recycling.
- ✓ Reduce wastes by selecting, in order of preference, avoidance, reduction, reuse and recycling.
- ✓ Incorporate waste minimization targets and measures into the environmental management plan.

When choosing between waste minimization options, the following hierarchy for waste management is preferred:

(I) waste avoidance and/or reduction

(ii) Reuse

(iii) Recycling

| Self-Check -8 | Written Test |
|---|---|

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

1. Which of the following methods is not used to protect our environment in mine area**.(3pts)**

   A. Proper waste disposal **C.** Improper waste disposal

   B. Improving the manufacturing process D. Improving the manufacturing process

2. What is environment? What environment includes. **(3pts)**
3. What measures should be taken to minimize erosion? **(3pts)**
4. _____ is a pile or storage location for bulk materials, forming part of the bulk material handling process. **(2pts).**

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

**Answer Sheet**

Score = _____

Rating: _____

Name: _____ Date: _____

**Short Answer Questions**

| | |
|---|---|
| **Operation Sheet-1** | Applying safety requirements |

**Steps to hazard assessment?**

- **Step 1:**Wear personal protective equipment
- **Step 2:** Identify hazards, i.e. anything that may cause harm.
- **Step 3:** Decide who may be harmed, and how.
- **Step 4:** Assess the risks and take action.
- **Step 5:** Make a record of the findings.
- **Step 6:** Review the hazard assessment.

| LAP Test | Practical Demonstration |
|---|---|

Name: _____ Date: _____

Time started: _____ Time finished: _____

**Instructions:** Given necessary templates, tools and materials you are required to perform the following tasks within 2 hours.

**TASK 1. Identify and state hazard assessment**

## List of Reference Materials


- ✓ Environmental Guidelines for Major Construction Sites. Environment Protection Authority 477 Collins Street, Melbourne Victoria 3000 AUSTRALIA, February 1996.Environmental protection and enhancement act. Revised statutes of Albert 2000 Chaptere-12 current as of December 15, 2017.
- ✓ Establishing Effective Policies, Procedures, and Management Controls.
- ✓ Excavated material and waste management. Version 1.1Last updated 15 February 2019.
- ✓ Guidance Note Preparing a Mine Safety Management Plan, February 2008 (version 4.1)
- ✓ Implement Traffic Management Plan. Participant Manual, July 2015
- ✓ RIICCM205E Carry Out Manual Excavation, August, 2016
- ✓ Safety & health in small-scale surface mines .a hand book, International Labour Office Geneva, 2001.
- ✓ Select, Use and Care for Hand Tools and Basic Equipment and Infrastructure


### 1- WEB ADDRESSES (PUTTING LINKS)


- ✓ **https://www.safeopedia.com/definition/704/site-specific-safety-plan**
- ✓ **https://www.lawinsider.com/dictionary/site-conditions**
- ✓ **https://www.ncbi.nlm.nih.gov/books/NBK43453/**