Mineral Resources Infrastructure Work

Level -1

Based on December 2018, Version 2 OS and April. 2021, V1 Curriculum

Module Title: Using Hand and Power Tool

LG Code: MIN MRI1 M10 LO (1-4) LG (34-37)

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April, 2021

Adama, Ethiopia

LG #34	LO #1- Plan and prepare

Instruction sheet

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

- Industry and worksite terminologies
- Accessing, Interpreting and applying relevant compliance documentation
- Obtaining , confirming and applying work instructions
- Job safety analysis (JSA)
- Obtaining and confirming site and equipment safety requirements
- Identifying and confirming environmental protection requirements
- Applying environmental management plan

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 –

- Know Industry and worksite terminologies
- Access, Interpret and apply relevant compliance documentation
- Obtain , confirm and apply work instructions
- Understand Job safety analysis (JSA)
- Obtain and confirm site and equipment safety requirements
- Identify and confirm environmental protection requirements
- Apply environmental management plan

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 8.
3. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish from “Self-check 1 up to Self-check 7
5. Ask 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).
6. 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 Information Sheet 2
7. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1 and operation Sheet
8. Submit your accomplished Self-check. This will form part of your training portfolio.

Information Sheet 1- Industry and Worksite Terminologies

1.1 .Concept of Industry and work site

1.1.1. Industry

Many people think of industry as the collective large-scale manufacturing of goods in well-organized plants with a high degree of automation and specialization. Although this is a common example of industry, it can also include other commercial activities that provide goods and services such as Mining, agriculture, transportation, hospitality, and many others. Industry can be classified into different categories. Such as:

- **Primary (first):** Primary industries are those that extract or produce raw materials from which useful items can be made. Extraction of raw materials includes mining activities, forestry, and fishing.
- **Secondary (second):** Secondary industries are those that change raw materials into usable products through processing and manufacturing.

Figure 1.1 Industries

1.1.2 Work site Information

Work site information (briefing) is important before starting operations; ensure that you have received work information from your supervisor, and a handover from the previous operator (if applicable). Briefings are conducted according to site policy. Information that should be provided in the briefing includes:

- Personnel and equipment scheduled to operate in the area
- known hazards in the work area
- Events that will occur onsite during the day that may affect your task
- Any problems that occurred during the previous day such as breakdowns and schedule slippage
- Updates such as revised survey data or amended priorities of work
- Current progress towards job completion. A toolbox talk or short safety discussion may also take place during the briefing. Do not start any work until you have fully understood the information given to you by the supervisor

Figure1.2. Work site Information

1.2. Terminologies of Industry and worksite

The following are terms commonly used on industry and work sites of mining.

Active workings - Any place in a mine where miners are normally required to work or travel and which are ventilated and inspected regularly.

Belt conveyor - A looped belt on which coal or other materials can be carried, and which is generally constructed of flame-resistant material or of reinforced rubber or rubber-like substance.

Bridge carrier - A rubber-tire-mounted mobile conveyor, about 10 meters long, used as an intermediate unit to create a system of articulated conveyors between a mining machine and a room or entry conveyor.

Chain conveyor - A conveyor on which the material is moved along solid pans (troughs) by the action of scraper crossbars attached to powered chains.

Chain pillar - The pillar of coal left to protect the gangway or entry and the parallel airways.

Check curtain - Sheet of brattice cloth hung across an airway to control the passage of the air current.

Chock - Large hydraulic jacks used to support roof in long wall and short wall mining systems.

Clay vein - A body of clay-like material that fills a void in a coal bed.

Coal - A solid, brittle, more or less distinctly stratified combustible carbonaceous rock, formed by partial to complete decomposition of vegetation; varies in color from dark brown to black; not fusible without decomposition and very insoluble.

Coal washing – The process of separating undesirable materials from coal based on differences in densities. Pyritic sulfur, or sulfur combined with iron, is heavier and sinks in water; coal is lighter and floats.

Coke – A hard, dry carbon substance produced by heating coal to a very high temperature in the absence of air.

Conveyor - An apparatus for moving material from one point to another in a continuous fashion. This is accomplished with an endless (that is, looped) procession of hooks, buckets, wide rubber belt, etc.

Crusher - A machine for crushing rock or other materials. Among the various types of crushers are the ball mill, gyratory crusher, Handel mill, hammer mill, jaw crusher, rod mill, rolls, stamp mill, and tube mill.

Cutter; Cutting machine - A machine, usually used in coal that will cut a 10- to 15-cm slot. The slot allows room for expansion of the broken coal. Also applies to the man who operates the machine and to workers engaged in the cutting of coal by pick or drill.

Detectors - Specialized chemical or electronic instruments used to detect mine gases.

Drill - A machine utilizing rotation, percussion (hammering), or a combination of both to make holes. If the hole is much over 0.4m in diameter, the machine is called a borer.

Drilling - The use of such a machine to create holes for exploration or for loading with explosives.

Feeder - A machine that feeds coal onto a conveyor belt evenly.

Geologist - One who studies the constitution, structure, and history of the earth's crust, conducting research into the formation and dissolution of rock layers, analyzing fossil and mineral content of layers, and endeavoring to fix historical sequence of development by relating characteristics to known geological influences (historical geology).

Manhole - A safety hole constructed in the side of a gangway, tunnel, or slope in which miner can be safe from passing locomotives and car also called a refuge hole.

Panic bar - A switch, in the shape of a bar, used to cut off power at the machine in case of an emergency.

Scrubber – Any of several forms of chemical/physical devices that remove sulfur compounds formed during coal combustion. These devices, technically know as flue gas desulfurization systems, combine the sulfur in gaseous emissions with another chemical medium to form inert "sludge," which must then be removed for disposal.

Self-check 1	Written test

Name…… ID…… Date…….

Directions**:** Answer all the questions listed below.

1. Define what industry means? 3 point
2. What is the importance of worksite information? 3 point
3. List at least three Terminologies of industry and worksite in mining? 4 point

Note: Satisfactory rating – Above 6 points Unsatisfactory - below 6 points

Information Sheet 2- Accessing, Interpreting and Applying Relevant Compliance Documentation

2. 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.

2.1 Overview of Documents

Documents include all the written policies, processes, and procedures of the laboratory. In order to develop laboratory documents, it is important to understand each of these elements and how they relate.

2.1.1 Differences between Documents and records

- **Document**s provide written information about policies, processes, and procedures.

Characteristics of documents are:

- ✓ communicate information to all persons who need it, including laboratory staff, users, and laboratory management personnel;
- ✓ need to be updated or maintained;
- ✓ must be changed when a policy, process, or procedure changes;
- ✓ Establish formats for recording and reporting information by the use of standardized forms. Once the forms are used to record information, they become records.

  Some examples of documents include a quality manual, standard operating procedures (SOP), and job aids.

- **Records** are the collected information produced by the laboratory in the process of performing and reporting a laboratory test.

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, patient records, quality control information, and patient reports. Information is

the major product of the laboratory, so manage it carefully with a good system for the laboratory's documents and records.

2.1.2 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 laboratory operations, each laboratory will develop policies specific to its own operations.

2.1.3. Process

Processes are the steps involved in carrying out quality policies. Process is defined as a set of interrelated or interacting activities that transform inputs into outputs. Some examples of laboratory inputs include test requests, samples, and requests for information.

2.1.4 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 laboratory staff 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.

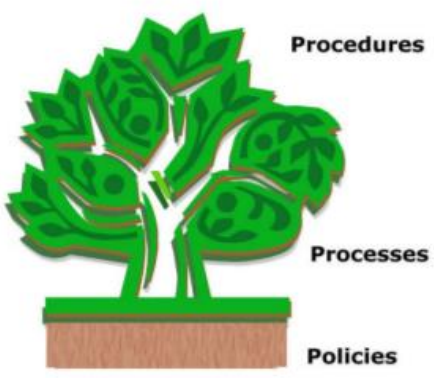


Figure 2.1.Shows relation between polices, process and procedures

2.1.5 Accessibility

The documents needed in the work process must be accessible to all staff. Persons managing samples should have the procedures for sample management directly available to them. Testing personnel will need the SOPs in a convenient place, and perhaps a job aid posted in clear view of the work space where testing is performed. The testing personnel need immediate access to quality control charts and trouble-shooting instructions for equipment. All staff must have access to safety manuals.

Self-Check – 2	Written test

Name…… ID…… Date…….

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

1. Write the differences between documents and records?(3pt)
2. Mention at least two characteristics of documents?(3pt)
3. Define what mean a process?(2pt)

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

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

Information Sheet 3- Obtaining, Confirming and Applying Work Instructions

3.1 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 students to perform tasks safely and reliably.

3.2 Safe Working Instructions necessary

Safe Working Instructions are required for any routine or repeated activity or process that is associated with a medium to high risk. Medium to high risk in this context means any activity or process where an injury may occur if the process is not carried out with care or attention. Where a process or activity is a known cause of injury then Safe Working Instructions are required.

3.3 Responsibilities

Supervisor and Employee: Supervisor led training is required upon employment for employees who operate hand and portable power tools.

- Select the Right Tool for the Job: Examples of unsafe practices are: Striking hardened faces of hand tools together (such as using a carpenter's hammer to strike another hammer, hatchet, or metal chisel), using a file for a pry, a wrench for a hammer, using a ‘cheater’, and pliers instead of the proper wrench.
- Keep Tools in Good Working Condition: Wrenches with cracked work jaws, screw drivers with broken points or broken handles, hammers with loose heads, dull saws, and extension cords or electric tools with broken plugs, improper or removed grounding prongs, or split insulation are examples of tools in poor conditions. Tools that have deteriorated in this manner must be taken out of service.

- Use Tools the Right Way: Screw drivers applied to objects held in the hand, knives pulled toward the body, and failure to ground electrical equipment are common causes of accidents.
- Place/Keep/Store Tools in a Safe & Secure Place: Many accidents have been caused by tools falling from overhead and by knives, chisels, and other sharp tools Hand and Power Tool Guidelines GS-91 Page 2 carried in pockets or left in tool boxes with cutting edges exposed. Tools should be kept away from work bench edges.

3.4 Developing Working Instructions

It is recommended that the preparation of safe working instructions be prioritized as follows:

- All new hazardous processes or activities should have Safe Working Instructions prepared before any hazardous process or activity is undertaken
- For existing processes, the preparation of Safe Working Instructions should be prioritized according to the level of risk, taking into account hazard exposure, frequency of exposure, and worker knowledge and experience.
- A higher priority should be placed on the tasks carried out by students.

Self-Check – 3	**Written test**

Name…… ID…… Date…….

Directions**:** Answer all the questions listed below.

1. Write the advantage of Safe Working Instructions? 4point
2. When are Safe Working Instructions necessary? 3point
3. Write the responsibility of supervisor and employee safe working instructions? 3point

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

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

Information Sheet 4- Understand Job Safety Analysis (JSA)

4. Job Safety Analysis (JSA)

The process of breaking down a job in to its constituent steps, listing the hazards associated with those steps and developing procedures to reduce those hazards appears in the work area. Job safety analysis, sometimes called job hazard analysis.

4.1 Job Safety Analysis

Job Safety Analysis refers to both the analytical process of developing safer job procedures and to the document that is developed as a result of the analysis. Obviously there are numerous industrial machines which are extremely dangerous to work with and hence thousands of workers become injured through accidents. Several accidents mostly occur in workplace due to lack of inattentiveness of workers, necessary knowledge to perform certain task and especially when working with new machines. The aim of risk identifications to is detect those potential hazards that could front a risk related to job.

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**

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

1. Define what mean job safety analysis? 3point
2. What is the importance of job safety analysis? 4point
3. What is the aim of risk identifications? 3 point

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

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

Information Sheet 5- Obtaining and confirming site and equipment safety requirements

Introduction: The purpose of this information sheet is to protect employees from the hazards associated with using hand or powered tools at work area.

5.1 The Occupational Health and Safety and its requirements may include:

- Personal protective equipment (PPE's)
- Workplace environment
- Safety handling of materials
- First Aid Kit

5.1.1 Personal protective equipment (PPE's)

When PPE is required to protect employees, it must be provided by the employer at no cost to employees, except for specific items, such as:

- Safety-toe footwear
- Prescription safety eyewear
- Everyday clothing and weather-related gear
- Logging boots

Fig.5.1 proper using of personal Equipment

N.B Eye wash Stations

Eye wash stations should be located within 100 feet of your work area. If you accidentally get something in your eyes, go directly to the eyewash station and flush your eyes with water for 15 minutes. Be sure to hold your eyes open with your fingers and "look" directly into the water streams.

5.1.2. Workplace environment:-

Systematic Work Environment Management

- Observing and taking account, in everyday work, of both psychological and social conditions and work environment issues of a physical nature.
- Taking decisions and measures, in everyday work, so that employees are not injured, do not fall ill and do not fare badly in any other way.
- Observing and taking account of all conditions in the work environment capable of affecting the employees' health and safety.
- Work environment management also applies to work not done at a permanent worksite, e.g. work on construction sites, transport work and work in other people's homes.

Reasons of Systematic Work Environment Management

- It leads to the discovery and prompt rectification of hazards in the workplace.
- It prevents employees meeting with accidents or suffering illness, stress or their negative consequences of work.
- It provides good working conditions, which can mean less sickness absence.
- It enhances job satisfaction and dedication.
- It reduces malfunctions and quality losses.
- It makes the whole undertaking tidier and more orderly, with operations running more smoothly.
- It helps to improve the firm's financial standing.
- It gives the firm a good reputation, facilitating the retention and recruitment of personnel.

5.1.3 Safety Handling Of Materials

Safe Manual Material Handling

- ✓ Many jobs require frequent lifting, carrying, pushing, pulling, lowering and raising materials by hand. These job tasks are often referred to as manual materials handling. Staff who lift or perform other materials handling tasks may be at risk for back or other injuries. These injuries may be prevented by redesigning jobs and practicing safe handling techniques.

Layout of Work Area

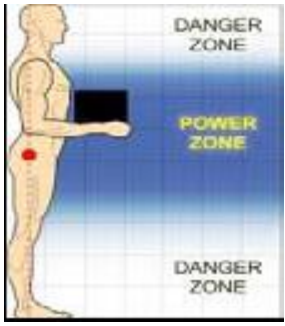
- ✓ The layout of work areas can be arranged to prevent awkward postures such as bending, twisting, and overreaching
- ✓ Work surfaces should be at waist height, or height-adjustable, to prevent bending
- ✓ There should be sufficient space to turn around and prevent twisting
- ✓ Materials that will be manually lifted should not be stored directly on the floor
- ✓ Frequently used and heavy items should be stored between knee and waist height
- ✓ Elevated platforms or step stools should be provided to reach items above chest level

"S.M.A.R.T. LIFTING TECHNIQUE"

1. Size Up The Load
    - Assess the size, weight, and shape. Remove obstacles from the load (such as loose wrapping materials).
    - Assess whether the load actually needs to be moved
    - Where is the load going to be placed? Remove obstacles from your path.
    - Determine whether mechanical or assistance from a co-worker is required
2. Move The Load As Close To Your Body As Possible
    - Stay close throughout the lift
    - The whole hand should be used to ensure a firm grip
3. Always Bend Your Knees
    - Maintain balance
    - Keep feet apart and in a comfortable position
    - Minimize bending at the waist
    - Bend your knees to a semi squat
4. Raise The Load With Your Legs
    - Lift smoothly, without jerking
    - Maintain the normal curve of your spine throughout the lift
    - Tighten the abdominal muscles and exhale while lifting

5. Turn Your Feet In The Direction That You Want To Move The Load
    - Avoid unnecessary bending, twisting, and reaching
    - Change direction by turning your feet and not your back
    - To set down a load, squat down and keep your head up. Let your legs do the work

The Power Zone



- ✓ The power zone for lifting is close to the body, between mid-thigh and mid-chest height. Comparable to the strike zone in baseball, this zone is where arms and back can lift the most with the least amount of effort. (see picture)

Team Lifting

- Team lifts are appropriate if:
    - The load is too heavy for one person
    - The load is large, bulky, or oddly-shaped
    - You feel uncomfortable lifting the load by yourself (and do not have the proper equipment)
- Whenever possible, team member should be of around the same height and build. If this is not possible, taller members should be at the back.

5.1.4. FIRST AID KITS

- ✓ First Aid is an immediate care given to a person who has been injured or suddenly ill.
- ✓ It includes self-care and home care if medical assistance is not available or delayed.

Objective of giving First Aid

- To bridge the GAP between the victim and the physician.

- Thus, prolonging life, alleviating suffering and preventing further injury.

Note: Not intended to replace the job of the physician

Ends when the service of the physician begins

INITIAL RESPONSE IN GIVING FIRST AID

A – Ask for help

I – Intervene

D – Do not harm further

Kits vary in contents but most kits have the following items:

- Band-aids / Adhesive bandages
- Gauze pads and tape
- Scissors, cold pack
- Wound bandage / compress
- Eye pads / eye wash solution
- First aid / burn cream
- Antibiotic ointment
- Face shield or barrier mask for providing CPR
- Forceps / tweezers

Figure. 5.2 first aid kit

Self-Check – 5	**Written test**

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Say true if the statements is correct and say false if the statement is incorrect

1. If you accidentally get something in your eyes, go directly to the eyewash station. 2point
2. Use plastics for your respiratory as safety in work site area. 2point
3. First Aid is an immediate care given to a person who has been injured or suddenly ill. 2point
4. When you are lifting heavy objects we should follow SMART techniques. 2point
5. There should be sufficient space to turn around and prevent twisting. 2point

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

Information Sheet 6- Identifying and Confirming Environmental Protection Requirements

6.1 Environmental Protection

Environmental protection can be defined as the prevention of unwanted changes to ecosystems and their constituent parts. This includes the protection of ecosystems and their constituent parts from changes associated with human activities; and the prevention of unwanted natural changes to ecosystems and their constituent parts.

6.2 Ethiopia's National Environmental Challenges

In Ethiopia, land degradation is a serious problem affecting agricultural productivity. Overgrazing and the expansion of farming into marginal lands caused by an increasing population pressure without increasing economic productivity have been leaving the land bare. Present key problems in land degradation include loss of vegetation cover and biodiversity followed by escalating soil erosion, declining soil fertility, expanding solemnization as well as aridity through hydrological cycle.

6.3 Measures Being Taken in Ethiopia

The right to live in a clean and healthy environment has been promulgated in the Constitution of the Federal Democratic Republic of Ethiopia. The commitment of the government has also been shown by its approving a relevant environmental policy, laws and regulations, standards as well as strategies that can help improve the country's environmental conditions.

The Conservation Strategy of Ethiopia (CSE) and the Environmental policy of Ethiopia (EPE) were adopted in 1997. Federal laws on environmental organs establishment, environmental pollution control, solid waste management, and environmental impact assessment (EIA) as well as effluent emission standards have been issued. In the course of one and half decades, the Government has ratified a number of international and regional multilateral environmental agreements (MEAs). They have been made part of the laws of the country. Moreover, a number of relevant environmental protection technical and procedural general and sectoral guidelines have also been prepared.

6.4 Environmental protection requirements

Alleviation Measure for the Control of Mining Activities on Water Resource

6.4.1 Controlling of Water pollution

Mining activities will almost always have an impact on water environment through direct or indirect contact of either the surface or groundwater. Therefore, industries must invest in ensuring that water is not contaminated or where contamination does occur, they invest in treatment or containment within appropriate reservoirs, pipelines, canals or other storage facilities. Mining industries must encourage adopting practices and technologies which are environment friendly. The practice that must be followed by the industries is as follows as highlighted by;

Resource conservation and management by scientific way with minimum waste;

Finding substitutes of the mineral widely used at present;

- ✓ Proper recycling of used metals.
- ✓ Adoption of environmental friendly technologies.
- ✓ Efficient and efficient use of energy.
- ✓ Forestation and preservation of biological diversity.
- ✓ Government should not permit mining operation in ecologically sensitive areas.
- ✓ Follow Acts, Rules and Regulation made by Ministry of Environment, Forest and climate change
- ✓ Waste food material, paper, decaying vegetables and plastics should not be thrown into the open or underground drains.

6.4.2 Control of Air Pollution

The following should be done to manage and control air pollution

- ✓ Use of better designed equipment and smokeless fuels, hearths in industries and at home.
- ✓ Automobiles should be properly maintained and adhere to recent emission-control standards.
- ✓ More trees should be planted along road side and houses.
- ✓ Renewable energy sources, such as wind, solar energy, ocean currents, should fulfill energy needs.
- ✓ Tall chimneys should be installed for vertical dispersion of pollutants.

6.4.3 Control of land Pollution

- ✓ Proper garbage disposal
- ✓ Recycle garbage
- ✓ Over packed items
- ✓ Efficient utilization of resources and reducing wage

Self-Check – 6	**Written test**

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

1. Write the advantage of environmental protection requirements?3point
2. Mention the environmental protection requirements? 3point
3. List the mechanisms Control of land Pollution (at least 4)? 4point

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

Information Sheet 7- Applying Environmental Management Plan

7.1. Environmental Management Plan(EMP)

The EMP is one of the potent tools for specifying how the mining or prospecting operations' environmental impacts are to be mitigated and managed.

7.1.1 Purpose of the EMP

- Ensure that commitments to minimize environmental effects are met;
- Document environmental concerns and appropriate protection measures;
- Provide concise and clear instructions to the industry workers regarding procedures for protecting the environment and minimizing environmental impact;
- Provide a reference document for personnel when planning and/or conducting specific activities;
- Provide contingency plans for accidental
- communicate changes in the program through the revision process; and
- Provide a reference to applicable legislative requirements

7.1.2. Environmental and social impacts of mining

Environmental Management Plan giving the environmental protection measures at mining to meet the stipulated norms, are as detailed.

A. Air Environment

As the proposed mining involves only scooping of River sand from the Delta (surface) of the river bed, the quality of the air will not be altered by this. As it is a manual mining using simple instruments / tools, there will not be emissions into the atmosphere. The surrounding area will not have any change in the air quality due to the proposed mining activity.

The following measures will be adopted in mining to eliminate the fugitive dust emission

Proposed Mitigating Measures**:** The dust generated during the vehicular movement will be controlled by spraying of water on roads for which water tanker fitted with sprayer are proposed. Over loading of trucks and consequent spillage on the roads will be avoided. Measures such as covering with tarpaulins over the loaded material will prevent spreading of River sand from the trucks.

B. Water Requirement

Waste Water**:** Sanitary waste water generated will be treated in septic tank followed soak pit outside the Mining block. Hence there will not be any impact due to the waste on the water environment.

Anticipated Impacts: There will not be any water pollution due to the following reasons in this proposed Mining activity.

C. Solid Waste

The mining does not involve any processes such as overburden removal, drilling, blasting and beneficiation. The mining will involve extraction of river sand by simple hand tool, sorting, manual picking and loading into trucks / tractor / trolley for transporting. Hence there will not be any waste disposal yards proposed.

D. Impact on Vehicular Traffic

The vehicles using this road are very few. The excavated sand will transported to the various places for Building construction, road construction places. River sand will be transported in tarpaulin covered trucks.

E. Noise Environment

The Mining of river sand will not have any adverse effect in Noise levels as the operations are totally manual in nature. No mechanical methods will be used in the sand excavation. The excavated sand will be transported in tarpaulin covered trucks.

F. Land Environment

In the proposed Mining activity there will not be much impact on the land environment due to the following reasons.

- There is no removal of vegetation such as plants, bushes in the work site.
- The proposed Mining of sand block area is situated on the delta /surface of river bed. Alter extraction / mining, the land is not utilized for any other purposes.
- No effluent generation as any further processing of mineral is proposed. Hence, no ground water contamination due to the proposed mining activity.

G. Biological Environment

As the area is devoid of any vegetation, river sand mining is not going to cause any damage to any plant species. Hence the anticipated negative impacts if any are only minor, temporary and easily reversible.

H. Occupational Health Management:

If the workers are continuously exposed for dust it may affect their respiratory systems depending upon the resistance of the individuals. However to overcome this problem, all the workers who work in the mining will be provided with special masks to prevent the same and also provided with PPE.

Self-Check – 7	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Say true if the statements is correct and say false if the statement is incorrect

1. One Purpose of the EMP Ensure that commitments to minimize environmental effects are met. 2point
2. The mining involve any processes such as overburden removal, drilling, blasting and beneficiation. 2point
3. The vehicles using this road are very few. 2point
4. If the workers are continuously exposed for dust it may affect their respiratory systems depending upon the resistance of the individuals. 2point
5. As the area is devoid of any vegetation, river sand mining is not going to cause any damage to any plant species. 2point

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

LG #35	LO #2- Select and Use Hand Tools

Instruction sheet
This learning guide is developed to provide you the necessary information regarding the following content coverage and topics – • Selecting Hand tools • Checking tools for serviceability and safety • Reporting faults • Clamping or fixing materials in position • Using hand tools safely and effectively • Locating hand tools safely 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 – • Select Hand tools • Check tools for serviceability and safety

- Report faults
- Clamp or fixing materials in position
- Use hand tools safely and effectively
- Locate hand tools safely

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Information Sheet 1- Selecting Hand tools

1.1 Hand Tools

A tool held on the hand and operated without power and electricity.

1.2 Select appropriate hand tools

Safe and effective use of hand tools is an important part of mining. Accidents can be caused by the misuse of hand tools, therefore it is important for you to become familiar with their safe use. This section provides an overview of the hand tools most commonly used in mining activities.

1.3 Hand Tool Safety: Selecting the correct hand tool for the job is vital for productivity, tool life and safety. Many hand tools operate on the principle of Mechanical Advantage (Through Leverage). This means the longer the effective lever, the greater the applied force (or torque).

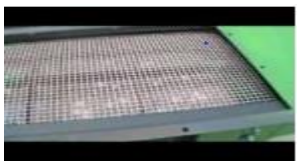
1.3.1 Hand Tool safety precautions

- ✓ Select and use the correct tool for the job
- ✓ Wear appropriate PPE
- ✓ Check blades, bits and attachments for sharpness and security.
- ✓ Know the capability and limitation of the tool.
- ✓ Keep your work area clear of rubbish and off-cuts.
- ✓ Never over-reach or apply excessive force when using hand tools.
- ✓ If required, firmly clamp or fix any work material in position before using the hand tool on it.
- ✓ Check handles for cracks, splinters and general wear and damage.
- ✓ Keep handles free of moisture and grease.
- ✓ Check that the work area is clear of obstacles that may pose a trip hazard.
- ✓ Check that the material you are using the hand tool on is not situated in front of or near power or service lines.

1.4 Common Mining hand tools: During Surface mining activity we might use the following tools:

Clamps	Hammers	Spades
Vices	Measuring tapes	Sledge hammers
Adjustable spanners	Axes	Spanners
Crow bars	Rakes	Wrenches
Pinch bars	Hand augers	Spirit levels and
Bolt cutters	Picks	Wire cutters
Chisels	Mattocks	File
Hacksaws	Pliers	Screwdriver
Handsaws	Shovels	Retractable cutters

1.5 Some Hand Tools with their Application

No	Name	Hand Tool Image	Uses
1	Hoe		• This tool is used to digging and to place concrete, cement mortar in head pan • The blade of the hoe rests on the ground and is moved back and forth to remove and breaking into hardened soil
2	Wheel Barrow		• This tool is used to transport cement mortar or any materials. Sometimes it also be used to measure the quantities of materials for site level concrete mixing
3	Sand screening tool		▪ This tool is used to sieve sand at site.

4	Chisel		▪ This tool is used to remove excess or waste hard concrete
5	Crow Bar		▪ This tool is used in formwork to remove nails from boards
6	Framing Hammer		▪ This tool is used to drive and remove nails
7	Hand Saw		This tool is used in wood works and shuttering
8	Spirit-levels		▪ Use it against smooth surfaces such as walls or while building to ensure that surfaces are straight and corners are at a 90° angle.
9	Pick axes and mattocks		• 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.

10 Spades

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

11 Shovels

- 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 is a wide scoop shovel

12 Rakes

- Steel garden rakes are used to level and prepare seedbeds for sowing.

13 Hammers

- Hammers are used nail nails or hooks into walls or wood (small hammers).
- Rubber hammers are used to level tiles.
- If you want to break down walls and concrete structures you need a sledge hammers.
- It is essential to use the correct hammer for the specific job.
- Small carpentry hammers are provided with an end that can remove nails.

14 Saws

- Generally handsaws are used to saw through wood.
- There are specialized saws available that are operated by two people that were designed for cutting down trees.
- Bow saws are used to trim trees or cut down branches.

15 Pliers

Pliers are used for various purposes, including:

- Tightening wire.
- Fixing wire.
- Gripping bolts to tighten with a spanner.
- Selected pliers are equipped with wire stripping edges and can strip the outer insulating layer off electrical cord

16 Spanners

- Various bolts can be fastened or loosened using the spanner of the correct size.

17 Screw drivers

- Tighten or loosen screws of different sizes.
- Flat ended screwdrivers are used to tighten or loosen flat head screws, whilst Philips screwdrivers (“star”) are used for star head screws.
- Some screwdrivers are magnetic and will hold the screw to the tip of the screwdriver.

Self-Check – 1	Written test

Name…… ID…… Date…….

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

Instruction one: Match the following with their similarities from Column “B” to column “A”(5point)

A	B
1. Saws	A. This tool is used to digging and to place concrete, cement mortar in head pan
2. Hoe	B. used to saw through wood.
3. Shovels	C. various bolts can be fastened
4. Spades	D. useful for cutting and digging heavy soil
5. Spanner	E. Used for digging and lifting loose soil or other substances.
	F. Used for drilling metal part

Instruction two: Give shot answer for the following questions

1. Mention at least common mining hand tools?2.5 point
2. Define what mean hand tools? 2.5 point

Answer Sheet

Score = _____

Rating: _____

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

Information Sheet 2- Checking tools for serviceability and safety

2.1. The importance of Hand Tool serviceability

Routine maintenance tasks refer to on-going, scheduled tasks that are performed in order to keep hand tools and basic equipment functioning properly.

2.2. Hazard identification

A hazard is something with a potential to cause loss or harm. You need to always be aware of potential hazards at work.

Hazards arise from:

- The work conditions
- the use of machinery and substances
- poor work procedures and design
- wrong or out-of-date systems and procedures
- inappropriate actions or behavior

2.3. Hazard classification

Once hazards have been identified, they must be classified. This is done to help prepare a Hazard Management Plan. Hazards are classified into five broad areas.

A. Physical- noise, radiation, light, vibration
B. Chemical- poisons, dusts
C. Mechanical- tools, electrical equipment
D. Psychological- fatigue, violence, bullying

2.4 .Special hazards in a mine environment

- Moving vehicles – dump trucks, loaders, underground shuttle cars
- Gas inflows
- Unstable ground – be aware but normally handled by a senior person

2.5. Sources of Advice

Information about reporting hazards or any concerns you may have about safety risks at

work can be reported to a:

- Supervisor
- Health and safety officer

- Health and safety representative
- Health and safety committee (usually found in larger workplaces

2.5 Risk management in the workplace

Risk: The chance of something happening that will have an impact upon objectives. Risk management protects people's safety and creates a safe work environment. In Workplace Health and Safety (WHS) terms, risk management is a way of identifying situations that might cause harm to people or property. It also includes acting to prevent a harmful situation happening or a person being hurt.

Self-Check – 2	**Written test**

Name…… ID…… Date…….

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

1. Writ the importance of hand tool serviceability? 4 point
2. Write the difference between risk and hazard? 4 point
3. List the classification of hazards? 2 point

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

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet 3- Reporting faults

Introduction

In this session we explore possible problems and malfunctions that might be experienced during the use of hand tools and explore how this may be remedied. We will further discuss the importance of reporting problems that with tools and equipment as well as the correct procedure to follow to report a problem or malfunction.

3.1 Problems and malfunctions of hand tools

All tools require regular maintenance to work properly. Clean all tools after each use with water and treat with a penetrating oil to prevent rust. Tools that require a sharp edge must be sharpened regularly as sharp tools are safer and more efficient to use.

- Various sharpening methods are used depending upon the tool.
- It is important to become familiar with the methods relevant to the tools you use.
- Check tools regularly for loose nuts and screws and tighten as needed.
- Sand rough handles and repair cracks as soon as they are noticed to prevent injury.
- Store tools in a dry area out of the elements.
- Hanging tools against a wall is an ideal way to organize the store tools in a shed.

3.2 Reporting problems and defective tools

Broken or damaged tools can cause injury or accidents in the workplace. The quicker problems are reported, the quicker the tool can be fixed or replaced and the less the risk or injury.

Broken or incomplete tools must not be used but placed in a special place for it to repaired or adapted. This will prevent injury and will enhance the life of the tool. Persons with proper training and skill should repair tools. Preventative maintenance like fastening loose nuts or shafts will greatly reduce the need for large-scale repairs.

3.3 Reporting problems and malfunctioning of tools

- Every work site has its own set of procedures and systems to deal with the organizing, issuing and controlling tool stock.

- It is important that you find out who is responsible for different aspect regarding tools and equipment on the job where you work.
- Also you should know who you have to report problems or defects to.
- Do not attempt to fix, maintain or use a tool if you have not been trained to do so.
- It is essential that problems and malfunctions be immediately reported to the correct person to prevent risk of injury through the use of the tools.

Self –Check-3	Written Test

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

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

Say true if the statements is correct and say false if the statement is incorrect

1. All tools require regular maintenance to work properly. 2point
2. Broken or damaged tools can cause injury or accidents in the workplace. 2point
3. The quicker the tool can be fixed or replaced and the less the risk or injury. 2point
4. Broken or incomplete tools must not be used but placed in a special place for it to repaired or adapted. 2point
5. Supervisors need to be trained to check that laborers use tools in a proper way. 2point

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 4- Clamping or fixing materials in position

4.1 Definition of Clamping

A clamp is a fastening device used to hold or secure objects tightly together to prevent movement or separation through the application of inward pressure.

4.2 Rules for clamping

1. Always use a piece of scrap wood between each jaws of the clamp and the work piece to prevent damage.
2. When a clamp is positioned, close the jaws until the clamp feels tight, when gluing, some will be squeezed out around the joint, a sign that it is tight enough.
3. Clamping pressure should be applied at right angles to the glue line otherwise slippage may result.
4. Do not over tighten; if the fit is accurate only moderate pressure is required, the purpose of a clamp is only to maintain uniform pressure between the two surfaces, not to force them to fit.

4.3 Principles of Clamping

A. Principles of Clamping Position**:**

- Clamping system should be positioned at thick sections of the work piece.
- Clamping should be positioned to direct the clamping force on a strong, supported part of the work piece.
- Clamping on unsupported part bends slender work pieces, affects accuracy of operation.
- Clamping system should not obstruct loading and unloading of the work piece.
- Clamping system should not obstruct the paths of cutting tool.
- Operator should be able to operate clamps easily and safely
- A vertical hole drilled in the bent work piece would become angular when the unclamped work piece springs back to its original shape.

B. Principles of Clamping Strength:

- The clamping system should be capable to hold the work piece securely against the forces developed during operation.
- Clamping device should be capable to be unaffected by the vibrations generated during an operation.
- The clamping force should not dent or damage the work piece with excessive pressure.
- For clamping weak and fragile work piece, clamping force should be equally distributed over a wider area of the work piece.
- While clamping soft work piece, clamps should be fitted with pads or softer materials such as Nylon or Fiber to prevent damage and denting of the work piece.
- Clamping faces should be hardened by proper treatments to minimize their wearing out.

C. Principles of Clamping Productivity:

- Clamping time should be minimized by using hand knobs, knurled screws, hand wheels and handles, and so that clamp can be tightened or loosened manually
- Most of the clamps use hexagonal nut or hand nut Hand operated clamping devices

D. Principles of Clamping Operator Fatigue:

- Operator fatigue should be taken into account.
- Clamping should be operator friendly.
- Clamping and releasing should be easy and less time consuming.
- Maintenance should be easy.
- It is better to use pneumatic or hydraulic clamping which reduces operator fatigue and saves clamping time.
- Hand nuts are more convenient for the operator than hexagonal nuts because a spanner is not required to tighten them.

4.4 Types of Clamps and their function

No	Name of	Image of clams	Function

clamp

1 <u>Bench vise</u>

- Used to secure an object to allow work to be performed on it
- Vises have two parallel jaws, one fixed and the other movable, threaded in and out by a screw and lever.

2 G Clamp

It can be used to clamp a work piece to a work surface or two parts of a work piece together. Jaw openings range from about one inch to over 8 inches.. The end of the screw section normally has a swivel head which enables the clamp to sit on irregular surfaces.

3 Hand Screw Clamps

Metal Hand Screw Clamps are mainly used in metal work; however they do have a use to clamp small items.

Wooden Hand Screw Clamps are ideal for furniture repairs, the adjustable jaws will also fit angled material

4 Sash Clamp

The clamp has a flat bar with a fixed jaw that adjusts with a screw action and a sliding jaw that is locked in positioned along the bar

			to suit the job being undertaken. These clamps are for big tasks such as sash windows, table tops, doors etc.
5	Pipe Clamps		These are very similar to the Sash cramps but using a round shaft instead of the flat bar. The length is determined by the length of the pipe used, they can be lengthened by adding additional length of tube
6	Bench Clamps		2 piece bench clamp which are designed to fit workbenches with holes 18-38mm. Clamping range 0-80mm. Those shown include quick release clamping action.
7	Quick Action Clamp		One hand operated clamp (operates like sealant guns) ideal for quickly and easily clamping all kinds of work pieces. Simple single finger release.
8	Quick Grip		Features one-handed operation with adjustable pressure, best for thin pieces as the jaws do not close square.
9	Power Clamp		Exact application of force and maximum power in a single movement.

10 Screw Clamp

Fast and powerful closing / opening due to special thread and handle grip

11 Speed Clamp

A metal bar with serrations. As the clamping pressure is applied the serrations lock & secure the sliding head.

Self-Check – 4	Written test

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

1. Write the advantage of clamping system? 3point
2. Mention the principles of clamping? 3point
3. List at least four types of clamping? 4pont

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 5- Using hand tools safely and effectively

5.1 Safe Use of Hands Tools

Hand tools include a wide variety of non-powered devices such as spanners & shifters, pliers, hammers, and screwdrivers. These tools may seem harmless, but they are the cause of many injuries. The two most common hazards associated with the use of hand tools are misuse and improper maintenance.

- Misuse occurs when a hand tool is used for something other than its intended purpose.
- Improper maintenance allows hand tools to deteriorate into an unsafe condition.

5.2 All Hand Tools

- Ensure you are properly trained to safely use the tool.
- Ensure you have the correct PPE for the task, some tools require different PPE to others.
- If the tool has guarding or other safety devices they shall be fitted as per the manufacturers specifications
- Inspect the tool for damage and or wear before use.
- Specially designed tools may be needed in hazardous environments. (Always use non-sparking tools in the presence of flammable vapors or dusts. Insulated tools with appropriate ratings must be used for electrical work).
- Never modify or alter a tool from its original manufacturers design.
- Never use homemade tools unless authorized to do so (check the prohibited items register).
- Never use a tool that is prohibited from site (check the prohibited items register).
- If in doubt stop the task and seek further advice before recommencing.

5.2 What follows are some tips on routine maintenance safely and effectively

- Use the correct tool for the job.
- Keep tools in good condition. Handles should be tight and free from defect.
- Cutting tools should be kept sharp.
- Wedges and punches should be free from "mushroom heads".
- Use and maintain power tools according to their operator instructions.
- Make sure power tools are properly grounded or are double insulated.
- Switch off and unplug power tools before changing blades or servicing and repairing.
- Wear clothing that is free of strings or loose ends that could catch.
- Wear appropriate personal protective equipment (PPE), such as glasses, goggles, dust masks, face shields, hearing protection, etc.
- Keep by standers at a safe distance.

- Keep all guards and shields in place.
- Unplug and store tools after use.
- Consider keeping power tools locked up to prevent unauthorized use.
- Check water and oil levels in machinery.
- Check and maintain cables and plugs.

Self-Check – 5	Written test

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

1. Write the advantage of safe use of hands tools?2.5 point
2. List at least four tips on routine maintenance safely and effectively? 2.5 point

Note: Satisfactory rating – 2.5 points Unsatisfactory - below 2.5 points

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 6- Locating hand tools safely

Proper Storage of Tools & Equipment

6.1 Importance of proper storage of tools and equipment

- It is an important factor for safety and health as well as good business.
- Improves appearance of general-shop and construction areas.
- Reduces overall tool cost through maintenance.
- This also ensures that tools are in good repair at hand.
- Teaches workers principles of (tool) accountability.

6.2 Pointers to follow in storing tools and equipment:

- Have a designated place for each kind of tools.
- Label the storage cabinet or place correctly for immediate finding.
- Store them near the point of use.
- Wash and dry properly before storing.
- Store knives properly when not in use with sharp edge down.

- Put frequently used items in conveniently accessible locations.
- Gather and secure electrical cords to prevent entanglement or snagging.
- Cutting boards should be stored vertically to avoid moisture collection.
- Metal equipment can be stacked on one another after drying such as storage dishes and bowls.

Make sure the areas where you are storing the equipment are clean, dry and not overcrowded.

Self-Check – 2	Written test

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

1. Write at least three importance of proper storage of tools and equipment? 2.5 point
2. Mention at least four pointers to follow in storing tools and equipment. 2.5 point

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Operation Sheet 1- Steps taken to conduct risk management

Steps taken to conduct risk management

Step 1- hazard identification: identify and classify the problem

Step 2- risk assessment: determine how serious the problem

Step 3- risk elimination or control: decide and action what needs to be done to solve the problem

Step 4- documenting risk assessment: Access procedures to maintain the elimination or control of the risk

LAP TEST	Performance Test

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within --- hour.

Task1. Mention the steps taken to conduct risk management

LG #36	LO #3- Select and use power tools

Instruction sheet

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

- Standard work practice
- Identifying energy sources for power tools
- Selecting power tools and equipment
- Checking tools for serviceability and safety
- Reporting faults
- Checking power leads/hoses visually for serviceability
- Clearing route for leads /hoses
- Fixing or clamping materials in position for power tool
- Using power tools safely and effectively
- Locating power tools safely

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 –

- Know Standard work practice
- Identify energy sources for power tools
- Select power tools and equipment
- Check tools for serviceability and safety
- Report faults
- Check power leads/hoses visually for serviceability

- Clear route for leads /hoses
- Fix or clamp materials in position for power tool
- Use power tools safely and effectively
- Locate power tools safely

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 8.
3. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish from “Self-check 1 up to Self-check 10
5. Ask 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).
6. 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 Information Sheet 2
7. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1 and Operation Sheet 2 in page 40 and 41 respectively
8. Submit your accomplished Self-check. This will form part of your training portfolio.

Information Sheet 1- Standard work practice

1.1 Definition

- Standardized work practice is a tool for maintaining productivity, quality, and safety, at high levels.
- Standardized work practice is defined as work in which the sequence of job elements has been efficiently organized, and is repeatedly followed by workers.

1.2 Importance of implementing Standardized Work practice in a work site

- Provides a basis for employee training
- Establishes process stability
- Reveals clear stop and start points for each process
- Assists audit and problem solving
- Creates baseline for kaizen
- Enables effective employee involvement
- Maintains organizational knowledge

1.3 Elements of Standardized Work Source:

A. Takt Time and Cycle Time
   - Takt Time = Daily operating time / Required quantity per day
   - Cycle Time = Actual time for process
   - Goal is to synchronize takt time and cycle time

B. Work Sequence
   - The order in which the work is done in a given process
   - Can be a powerful tool to define safety and ergonomic issues

C. In-Process Stock
   - Minimum number of unfinished work pieces required for the operator to complete the process

➢ Standard safety work or operating procedure can be presented in different ways such as:

- Written Tasks
- Check list
- Flow charts
- Drawings and diagrams
- Information sheets
- Manufacturer’s instructions

1.4 Some Common Safe Work Practices

- Always follow manufacturer recommendations regarding maintenance and safe use
  - ✓ Guards in place and working
  - ✓ All power cords in safe working condition
  - ✓ Timely replacement of blades, bits, etc.
  - ✓ Never bypass a safety feature
- Never modify a tool beyond its intended use.
- Use all required personal protective equipment

Self-Check – 1	Written test

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

1. Define what mean standardized work practice?3point
2. Mention at least four implementing Standardized Work practice in a work site? 3point
3. List the elements of standardized work source? 4point

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 2- Identifying energy sources for power tools

2.1 Definition of power tools

Power tools is a tool that is actuated by an additional power sources and mechanism other than the manual labor used with hand tools.

2.2 Power sources of power tools

General we have three energy sources of power tools.

Such as: electric, pneumatic, hydraulic power tools, Petrol or Diesel Generators and batteries.

A. Electric power tools

These materials can be used electric as a power sources. The following are some of examples of electric power tool their functions.

Table-1 Electric Power Tool Their Functions

No	Name	Image	Function of power tools
1	Crushing Grinders		▪ used for grinding (abrasive cutting) and polishing
2	Planers		▪ Is a tool for shaping wood using m otorized power to force the cutting blade over the wood surface of larger tasks
3	Drills		▪ used for making round holes or driving fasteners

4	Gold Detector Machine		▪ an electronic instrument which detects the presence of metal nearby and are useful for finding metal inclusions hidden within objects, or metal objects buried underground

B. Pneumatic power tools are a power tool derived by compressed air supplied by an air compressor.

Table-2 Pneumatic Power Tool Their Functions

No	Name	Image	Function of power tools
1	Pneumatic wrenches		▪ used to absorb the torque and allows the tool operator to use it with very little effort
2	Rotary hammers/drills		▪ can perform heavy-duty tasks such as drilling and chiseling hard materials

3	Impact hammers		▪ Used to break up rock, pavement, and concrete.
4	Pneumatic drills		▪ used to break up rock and pavement
5	Screwdrivers or impact drivers		▪ Used by mechanics to loosen larger screws (bolts) and nuts that is corrosively "frozen" or over-torque.
6	Pneumatic grinder		▪ They can be used to help quickly remove excess materials from a work piece, smooth metal joints after welding or remove paint and primer

C. Hydraulic power tools**:** are transmitted by the controlled circulation of pressurized fluid, usually water-soluble oil or water-glycol mixture, to motor that converts in to a mechanical output capable of doing work.

Table-3 Hydraulic Power Tool Their Functions

No	Name	Image	Function of power tools
1	Hydraulic press		▪ It uses the hydraulic equivalent of a mechanical lever to generate a compressive force
2	Hydraulic jack		▪ Is a device that uses force to left heavy loads

D. Petrol or Diesel Generators

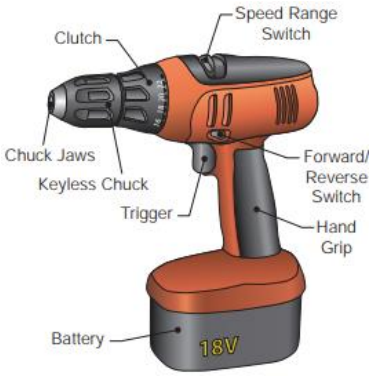
Portable generators are a common source of electrical power on small work sites. When using tools connected to petrol or diesel generators

Figure 1-Portable Generator

E. Batteries

Cordless tools are powered by batteries. These batteries must be recharged on a regular basis.

Table- 4 Power Tools operated by Batteries and their Functions

No	Name	Image	Function of power tools
1	Gold Detector Machine		▪ an electronic instrument which detects the presence of metal nearby and are useful for finding metal inclusions hidden within objects, or metal objects buried underground
2	Battery-powered Cordless Drill		Drill holes in material.

Self-Check – 2	Written test

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

1. Write the definition of Power tools? 3point
2. List at least three electric power tools with their functions? 3point
3. Mention at least four pneumatic power tools with their functions? 4 point

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 3- Selecting Power Tools and Equipment

3.1 Tool Selection

Correct selection, use and inspection of power tools are an important part of your work on site.

- The tool should perform the job it is intended for.
- The tool must be usable by the employee and not cause discomfort or physical pain.
- Handle shape/form:

- ✓ It should minimize hand and upper body stress.
- ✓ It should be ergonomically well-designed to reduce hand fatigue.

- Quality of the tool
  - ✓ sharpness
  - ✓ strength
  - ✓ reliability
- Vibration control
- Vibration may cause hand-arm syndromes; such as hand-arm vibration syndrome (HAVS), aka Reynaud's syndrome.
- Provide workers with pads or gloves.
- Use administrative controls such as work rotation or frequent breaks.
- If possible, use foot controls and alternate hand and foot use.
- Work stations
  - ✓ Each work station should be adjustable so that it may be adjusted to different worker requirements.
  - ✓ It should facilitate full range of motion.
  - ✓ If possible, provide mechanical means of handling materials.
- Work methods evaluation
  - ✓ How much force is needed to hold and/or use the tool?
  - ✓ What is the direction of the force?
  - ✓ What is the weight of the materials?
  - ✓ How many repetitions must the worker perform?
  - ✓ What is the employee's postural position?

3.2 Select Proper Power Switches

Hand-held power tools must be equipped with one of the following:

A. Constant pressure switch

Shuts off power upon release

Examples: circular saw, chain saw, grinder, hand-held power drill

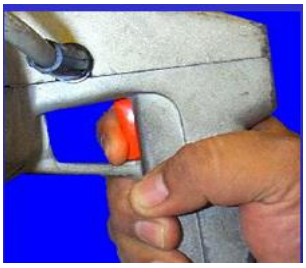


Figure 3.1-Constant pressure switch

B. On-Off Switch

Examples: routers, planers, laminate trimmers, shears

Figure 3.2-On-Off switch

Self-Check – 3	Written test

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

1. Write the advantage of tool selection? 3point
2. Mention at least three important of work methods evaluation? 3point
3. What is the difference between constant pressure switch and On-Off Switch? 4 point

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 4- Checking tools for serviceability and safety

4.1 Power Tools - Precautions

- Disconnect tools when not in use, before servicing and cleaning, and when changing accessories Power Tools – Precautions
- Secure work with clamps or a vise, freeing both hands to operate the tool
- Keep tools sharp and clean
- Consider what you wear – loose clothing and jewelry can get caught in moving parts
- Remove damaged electric tools & tag them: “Do Not Use

4.2 Precautions of Electric power tools

- Don’t carry portable tools by the cord
- Don’t use electric cords to hoist or lower tools
- Don’t yank cord or hose to disconnect it
- Keep cords and hoses away from heat, oil, and sharp edges

Figure 4.1-improper use of power tool

4.3 Precautions of Pneumatic and Hydraulic Power Tools

- Ensure the tool is well lubricated as per the manufacturer’s recommendations
- Never alter, repair or modify a pneumatic or Hydraulic power tool
- Check the tool, the hoses and the compressor/hydraulic pumps prior to use
- Use safety clips or other safety devices on compressed air hoses
- Never use any other gasses in the place of compressed air
- Ensure that any hydraulic pumps are filled with the correct fluids and has sufficient fluid levels
- Ensure that over pressurization warning devices are functional
- Always isolate air compressors and hydraulic pumps, ensuring that the pressure has been released or controlled before making adjustments or tool changes.

4.4 Precautions of Petrol or Diesel Generators

Portable generators are a common source of electrical power on small work sites. When using tools connected to petrol or diesel generators, observe the following safety precautions

- Place the generator on flat dry ground.
- Never operate an internal combustion engine in a confined space.
- Check that there is at least one meter of clear space on all sides.
- Dry your hands before touching the generator.
- Switch the generator off and allow it to cool down before refueling.
- Plug the portable power tool directly into the generator.

- Do not use double adapters and spider boxes

4.5 Precautions of Using Batteries

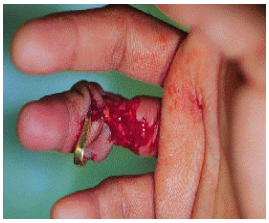
Cordless tools are powered by batteries. These batteries must be recharged on a regular basis.

- Observe the following precautions when using cordless power tools.
  - ✓ Recharge a cordless tool and its battery with the specified charging unit.
  - ✓ Charging should be done in a safe dry environment.
  - ✓ Unless the batteries are removed, the tool can function at any time when the switch is turned on.
  - ✓ Remove batteries or lock the switch before changing accessories and adjusting or cleaning tools.
  - ✓ Avoid exposing the battery pack to moisture.
  - ✓ Do not touch the terminals with any conductive material or store the battery pack in a container with metal objects such as wire, nails or coins.

4.4 Common Power Tool Hazards

- Workers using power tools may be exposed to a number of potentially serious hazards:
  - ✓ Hit by flying material from the work piece
  - ✓ Hit by flying part of a broken tool
  - ✓ Explosion or fire resulting from sparks from a tool igniting combustible materials
  - ✓ Electric shock from a broken tool, frayed or defective power cord, or improper grounding
  - ✓ Exposure to harmful dusts, fumes, mists, vapors, and gases
- Hazards are usually caused by misuse, improper maintenance and complacence.

- With power tools, carelessness and mistakes can lead to serious and often permanent injuries and even death



Using saw while wearing a wedding ring striking worker in face

Grinding wheel exploded

Grinding wheel exploded striking worker in face

Hand of worker shocked by drill he was holding

Figure 4.2 -Common Hazards Lead to Serious Injuries

4.5 Hazard Prevention - 5 Simple Rules

- All hazards involved in the use of power tools can be prevented by following five basic safety rules:
    a. Always inspect each tool as well as power cords and attachments for damage before use
    b. Keep all tools in good condition with regular maintenance.
    c. Always use the right tool for the job
    d. Only operate power tools according to the manufacturer's instructions -- That means Read the Instruction Manual!

Always use the appropriate protective equipment!

Self-Check – 4	Written test

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

1. List the 5 simple rules of hazards mitigation? 5point
2. Mention at least four common power tool hazards?2.5 point
3. List at least three power tools – precautions? 2.5 point

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 5- Reporting faults

5.1 Introduction

In this session we explore possible problems and malfunctions that might be experienced during the use of power tools and explore how this may be remedied. We will further discuss the importance of reporting problems that with tools and equipment as well as the correct procedure to follow to report a problem or malfunction.

5.2 Reporting problems and defective power tools

- Broken or damaged tools can cause injury or accidents in the workplace. The quicker problems are reported, the quicker the tool can be fixed or replaced and the less the risk or injury.
- Broken or incomplete tools must not be used but placed in a special place for it to repaired or adapted. This will prevent injury and will enhance the life of the tool.
- Persons with proper training and skill should repair the power tools. Preventative maintenance like fastening loose nuts or shafts will greatly reduce the need for large-scale repairs.

5.3 Reporting problems and malfunctioning of power tools

- Every work site has its own set of procedures and systems to deal with the organizing, issuing and controlling tool stock.
- It is important that you find out who is responsible for different aspect regarding tools and equipment on the job where you work.
- Also you should know who you have to report problems or defects to.
- Do not attempt to fix, maintain or use a tool if you have not been trained to do so.
- It is essential that problems and malfunctions be immediately reported to the correct person to prevent risk of injury through the use of the tools.
- It is important to respect the roles of the people placed in charge of organizing and maintaining tools\because this also protects your safety.
- Supervisors need to be trained to check that laborers use tools in a proper way. Even when using a tool correctly a certain way of handling the tool will cause premature wear or damage to it.

Self-Check – 5	Written test

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

1. Write the advantage of reporting faults? 2.5 point
2. Who is responsible to report problems and defective power tools? 2.5 point

Note: Satisfactory rating - 2.5 point points Unsatisfactory - below 2.5 point points

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 6- Checking power leads/hoses visually for serviceability

6.1 Checking Main Power Leads/Cables

- An electrical power cable or cord connects the tool to the mains power supply. Before connecting any electrical tool to a power source, inspect the:
  - ✓ Casing and switch
  - ✓ Lead and plug
  - ✓ inspection tags are up-to-date
  - ✓ Ventilation holes are clean
  - ✓ Spider boxes

Figure 6.1- Inspecting of Leads

- Electrical tools can generate sparks and should not be operated near flammable liquids/gases or explosive environments.
- Make sure that the route for leads and hoses is clear of all hazards and connections are away from water and other conductive materials

  <u>Do not</u>:
  - ✓ Use equipment with damaged leads or expired inspection tags
  - ✓ Use double adaptors
  - ✓ Carry or suspend tools by their leads

Figure 6.2- Inspecting of Tag

6.2 Checking Hydraulic or Pneumatic Hoses and Fittings

Hydraulic or Pneumatic Hoses

Hydraulic hoses are subject to extreme conditions such as, pressure differentials during operation and exposure to weather, sun, chemicals, high temperature operating conditions or mishandling during operation or storage.

Figure 6.3- Hydraulic

Inspect hoses for signs of deterioration or damage.

- ✓ Check hoses for leakage and replace when leaks are found.
- ✓ Keep body and hands away from pin hole leaks or nozzles that eject hydraulic fluid under pressure.
- ✓ Use paper or cardboard, not hands, to search for leaks. Hydraulic or Pneumatic fluid escaping under pressure can have sufficient force to penetrate the skin and do serious damage.
- ✓ If fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this type of injury or gangrene may result
- ✓ When replacing a hydraulic hose, be sure that the hose is straight (not twisted) before tightening the fittings.

6.3 General Instructions for Visual Inspection of Hoses

1. Look for cuts, gouges, or worn spots in the hose cover that expose textile or wire reinforcement.
2. Inspect for soft spots, bulges or blisters in cover, sections of mashed flat hose or kinked areas.

3. Carefully examine a length of the hose (18" in length adjacent to where the coupling is attached) for any damage such as kinks, soft spots, cover cracks, or permanent deformation of the hose from its original form.
4. Check couplings for any slippage which is evidenced by misalignment of the coupling or scored/exposed areas on the hose cover next to the coupling which indicates movement of the coupling.

Check couplings for worn threads, loose clamps or bands, worn gaskets, worn or broken handles, cam-arms and pins

Self-Check – 6	Written test

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

Say true if the statements is correct and say false if the statement is incorrect

1. An electrical power cable or cord connects the tool to the mains power supply. 2 point
2. Electrical tools can generate sparks and should be operated near flammable liquids/gases or explosive environments. 2 point

3. Make sure that the route for leads and hoses is clear of all hazards and connections are away from water and other conductive materials. 2 point
4. Keep body and hands away from pin hole leaks or nozzles that eject hydraulic fluid under pressure. 2 point
5. Use paper or cardboard, not hands, to search for leaks. Hydraulic or Pneumatic fluid escaping under pressure can have sufficient force to penetrate the skin and do serious damage. 2 point

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 7- Clearing route for leads /hoses

7.1 Introduction

If you are working in a large company that has a lot of hydraulic machinery and a lot of highly trained hydraulic individuals, you know how important it is to have clean hydraulic oil. One of the sources of hydraulic contamination is from ingression. Ingression happens anywhere where it's added to the system through just plain dirt dropping in your reservoir, from steel filings or from anywhere outside the system. You don't want to be additive to that if you're doing hydraulic hose assembly.

7.2 Cleaning Hoses

1. Hoses should be thoroughly flushed out and drained before testing and after service or prolonged storage
2. Flush with fresh water, detergent or suitable solvent at ambient temperatures
3. Cleaning fluids should be flushed out with clean water to avoid chemical reactions with service products

- This process is typically accomplished by flushing the interior of the hose with water or a cleaning solution. Cleaning procedures may differ by industry
  - ✓ All staff must wear personnel protective gear, i.e. eye protection & hard hat, gloves, protective clothing, etc.
  - ✓ Cleaning solutions should be able to dissolve or remove the residue material in the hose assembly and must be compatible with the hose tube & couplings.
  - ✓ All material flushed along with the cleaning solution must be processed in accordance with EPA requirements.
  - ✓ Extreme care must be taken when inserting cleaning devices such as brushes, steam wands etc.
  - ✓ To insure no cleaning chemical residue is left in the hose assembly, the hose can be hung vertical for a brief time to drain.
  - ✓ Warm air (120°F) can be circulated through the hose for drying.
  - ✓ If hose is cleaned in a dip tank, do not exceed the temperature limits of the hose.
  - ✓ Steam cleaning is not a preferred method of cleaning. Only use steam when it is recommended for the specific type of hose.
  - ✓ NEVER use superheated steam

7.3 Safety Warning

Before conducting any pressure tests on hose, provisions must be taken to ensure the safety of personnel performing the test and to prevent any possible damage to property. Only trained personnel using proper tools and procedures should conduct any pressure test. Hydro test the hose after it has been completely inspected as described.

a. Air or other compressed gases should not be used for pressure testing.
b. All air should be removed from the hose prior to testing by bleeding it through an outlet valve attached to one end of the hose.

c. The outlet ends of the hose should be placed so that an ejected fitting will be restrained by a wall, sand bags, etc.
d. Provision must be made to protect personnel from the forces of the pressure media if a failure occurs.
e. Testing personnel must never stand over, in front of, or in back of the ends of a hose being pressure tested.
f. Inspect the hose tube for hardness, color change, cracks, blisters, erosion, etc

Self-Check – 7	Written test

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

Say true if the statements is correct and say false if the statement is incorrect

1. After you create a hose assembly, you need to clean the hose. 2 point
2. One of the sources of hydraulic contamination is not from ingression. 2 point
3. Hoses should be thoroughly flushed out and drained before testing and after service. 2 point
4. Cleaning fluids should be flushed out with clean water to avoid chemical reactions with service products. 2 point

5. To insure no cleaning chemical residue is left in the hose assembly, the hose can be hung vertical for a brief time to drain. 2 point

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 8- Fixing or clamping materials in position for power tool

8.1 Introduction of Clamps

Clamps are another useful holding tool, like other tools, require some maintenance; lubricate periodically, and keep threads clean and free of rust.

Usually larger tubes and pipes are cut with power cutters. In any case, it is important not to force too much pressure on the cutting wheel as it may shatter and cause dangerous fragments to fly off. When setting up to cut, make sure to check the cutting wheel for nicks and make sure to keep the cutter perpendicular to the tube or pipe to ensure accurate tracking.

For larger clamping jobs there are **bar clamps** and **pipe clamps.** Usually larger tubes and pipes are cut with power cutters

A. **Pipe clamps:-**a clamp for Holding pipe that is to be cut or threaded

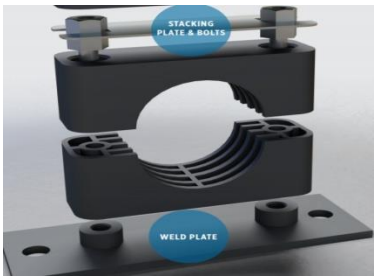


FIG 8.1.Pipe clamps

B. **Bar clamps:-** a frame consisting of a long bar with two adjustable clamping jaws that is used usually in woodwork or cabinetmaking for holding large work

Figure 8.2.Bar Clamp

Self-Check – 8	Written test

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

Say true if the statements is correct and say false if the statement is incorrect

1. Usually larger tubes and pipes are cut with power cutters. 2.5 point
2. Bar clamps is a clamp for holding pipe that is to be cut or threaded. 2.5 point

Note: Satisfactory rating – 2.5 points Unsatisfactory - below 2.5 points

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 9- Using power tools safely and effectively

9.1 Safe Use of Power Tools

All power tools can be dangerous if both general and tool specific safety instructions are not followed carefully. General safety instructions apply to all electric (corded and cordless), pneumatic & hydraulic power tools.

9.2 Safe Use All Power Tools

- Assess the risks before using tools.
- Ensure you are properly trained and authorized to safely use the power tool. Always read and understand the tool's operator's manual, tool markings and the instructions packaged with the accessory before starting any work.
- Ensure you have the correct PPE for the task, some tools require different PPE to others.
- If the power tool has guarding or other safety devices they shall be fitted as per the manufacturers specifications

- Inspect the power tool for damage and or wear before use.
- Horseplay with any tool is strictly prohibited
- Do not operate power tools in explosive atmospheres, near flammable liquids, gases, or dust.
- Wait for the tool to stop spinning before placing it on the ground or bench
- Always switch off the tool and remove the plug before making adjustments
- Remove adjusting keys and spanners before operating
- Never modify or alter a power tool from its original manufacturers design.
- Never attempt to repair a faulty power tool unless authorized to do so
- Never use a tool that is prohibited from site (check the prohibited items register).
- Take all damage power tools out of service by attaching a warning tag
- If in doubt stop the task and seek further advice before recommencing.
- Explosive Power Tools are prohibited

9.3 Pneumatic & Hydraulic Power Tools

- Ensure the tool is well lubricated as per the manufacturer's recommendations
- Never alter, repair or modify a pneumatic or Hydraulic power tool
- Check the tool, the hoses and the compressor/hydraulic pumps prior to use
- Use safety clips or other safety devices on compressed air hoses
- Never use any other gasses in the place of compressed air
- Ensure that any hydraulic pumps are filled with the correct fluids and has sufficient fluid levels
- Ensure that over pressurization warning devices are functional
- Always isolate air compressors and hydraulic pumps, ensuring that the pressure has been
- Released or controlled before making adjustments or tool changes.

9.4 Electric Power Tools (corded and cordless)

- Wired electric and cordless power tools shall be tested and tagged and only used on a protected circuit.
- The use of extension leads will be used in accordance with the requirements set out in the electrical Safety Manual

- Do not use AC tools on a DC power supply (vice-versa)
- Ensure the correct current rated circuit is used (never modify a 15amp plug to fit into a 10amp socket)
- Do not use power tools in the rain or wet environments, approval from supervisor required for some tools such as cordless power tools
- Do not carry a power tool by its power lead
- Store cordless battery packs away from other metal objects like paper clips, coins, keys, nails, screws, or other small metal objects.
- Never overcharge battery packs – follow manufacturer's instructions
- Never disassemble a power tool or battery pack unless authorized to do so

Self-Check – 9	Written test

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

Say true if the statements is correct and say false if the statement is incorrect

1. Use AC tools on a DC power supply (vice-versa) 2 point
2. Do not carry a power tool by its power lead. 2 point
3. Use safety clips or other safety devices on compressed air hoses. 2 point
4. Horseplay with any tool is prohibited in work site area. 2 point
5. Modify or alter a power tool from its original manufacturers design. 2 point

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 10- Locating power tools safely

10.1 Definition of Location

Location means arranging necessary items so that they are easy to use and labeling them so that anyone can find them and put them away. The key word in this definition is “anyone”. No matter how well you arrange items, location can have little impact if many of the items are unnecessary and not sorted.

10.2 Benefits of Location

Location is important because it eliminates many kinds of waste from operations in a workplace. These include searching time waste, waste due to difficulty in using items, and waste due to difficulty in returning items. In general, the following problems and wastes are avoided when set in order is well implemented.

1. Motion wastes
2. Searching time wastes
3. The waste of human energy
4. The waste of excess inventory
5. The waste of defective products
6. The waste of unsafe conditions

There are some principles for deciding best locations for tools and equipments. Jigs, tools and dies differ from materials, equipments, machinery and parts in that they

must be put back after each use. Some of the principles for jigs, tools and dies also apply to parts, equipments, and machinery. These are:

- Locate items in the workplace according to their frequency of use. Place frequently used items near the place of use. Store infrequently used items away from the place of use.
- Store items together if they are used together, and store them in sequence in which they are used.
- Device a “just let go” arrangement for tools. This approach involves suspending tools from a retractable cord just within reach so that they will automatically go back in to their correct storage position when released.
- Make storage places larger than the items stored there so that they are physically easy to remove and put back
- Eliminate the variety of jigs, tools and dies needed by creating a few jigs, tools and dies that serve multiple functions.
- Store tools according to function or product. Function-based storage means storing tools together when they have similar functions. This works best for job-shop production. Product-based storage means storing tools together when they are used on the same product. This works best for repetitive production

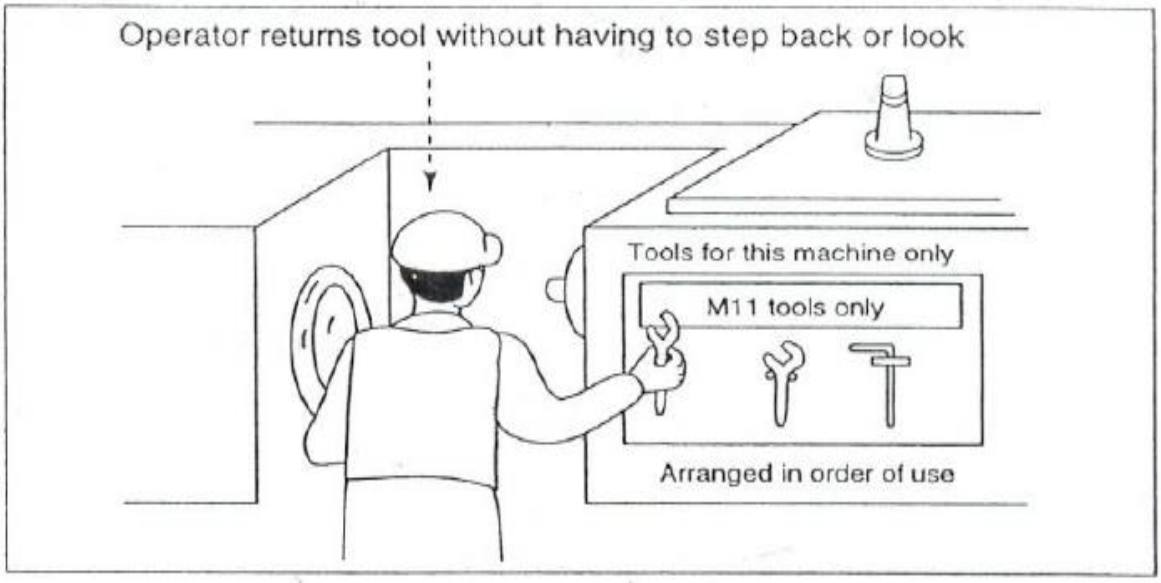


Figure 10.1 Tools kept in their proper location

10.3 Evaluating current locations and deciding best locations

Putting tools in the right position is a tool that can be used to evaluate current locations of parts, jigs, tools, dies, equipment, and machinery, and to decide best locations. Putting tools in the right position involves creating two maps ‘before map’ and ‘after map’. The ‘before map’ shows the layout of the workplace before implementing set in order. The ‘after map’ shows the workplace after implementing location.

Self-Check – 10	Written test

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

1. Define what mean location in power tool? 2 point
2. Mention at least five problems and wastes which are avoided when set in order is well implemented. 2 point
3. List at least four principles for jigs, tools and dies also apply to parts, equipments, and machinery. 2 point

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

LG #37	LO #4- Clean up

Instruction sheet

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

- Environmental management plan
- Clearing work area and disposing or recycling materials
- Clearing , checking, maintaining and store Machineries, tools and equipment

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 –

- Follow environmental management plan
- Clear work area and disposing or recycling materials
- Clear , check, maintain and store Machineries, tools and equipment

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 8.
3. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish from “Self-check 1 up to Self-check 3
5. Ask 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).
6. 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 Information Sheet 2
7. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet in page 13.
8. Submit your accomplished Self-check. This will form part of your training portfolio.

1. ”

Information Sheet 1- Environmental management plan

Legislation requires that an Environmental Management Plan (EMP) be prepared for any work site. The purpose of the plan is to minimize the impact of operations on the surrounding environment. You must identify from the plan the environmental protection requirements relating to your task and apply them to your work.

The plan will include the following procedures and practices;

- Dust prevention and minimization
- water quality control

- noise and vibration control
- minimizing loss or damage of vegetation and topsoil
- use, carriage and storage of fuels, oils and other chemicals
- clean up of oil, lubricant or chemical spills
- waste management
- Handling of dangerous substances and chemicals.

The environmental management plan will also contain a list of control measures that must be in place. If you notice any of these control measures are damaged or missing, report it to your supervisor immediately

Figure-1.1. Environmental management plan

Self-check 1	**Written test**

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

1. What is the purpose of environmental management plan? 2.5 point
2. Write the procedures and practices that will include in plan? 2.5 point

Note: Satisfactory rating – 2.5 points Unsatisfactory - below 2.5 points

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 2- Clearing work area and disposing or recycling materials

2.1 Site preparation and clearing

If a mine site is located in a remote, undeveloped area, the project proponent may need to begin by clearing land for the construction of staging areas that would house project personnel and equipment. Even before any land is mined, activities associated with site preparation and clearing can have significant environmental impacts, especially if they are within or adjacent to ecologically sensitive areas.

2.2 Disposal of Materials by using 3R

To reduce waste problems in future, reduction in waste generation and re-use of old products and possible reduction at the consumption level include better buying

habits and cutting down on the use of disposable products and packaging. The following 3R are mostly used in waste prevention methods

a. **Reduce**: Buy only what you need because a better way to reduce waste is by not creating it.
b. **Reuse**: If you have to acquire goods, try getting used ones or obtaining substitutes.
c. **Recycle**: When discarding your waste, find ways to recycle it instead of letting it go to landfill.
    - Residual wastes which cannot be used by any means should be **disposed** properly.

2.3 Solid Waste from Mines

Waste rock and tailing, no matter which kind of development program was utilized in a mine, are the upper most solid waste in the duration of exploitation of mineral resource. The discharging of waste rock and tailings has large portion of mine land use and higher safety requirements. Simultaneously, it also brings great destruction to the mine area environment.

2.3. 1 Waste rock: – Waste rock is one of the maximum solid wastes occurred in the mining industry. In order to extract ore, large amount of rock is stripped or excavated and transported to the waste-rock dump.

2.3 2.3.2 Tailings-: Tailings are the major solid wastes produced in the process of mineral beneficiation. In order to extract usable minerals, ore was crushed and milled to appropriate size, then, the usable minerals were separate from unusable minerals via different beneficiating methods.

2.4 Reclamation of Solid Wastes

2.4.1 Utilization of waste rock for construction

Waste rock results from stripping in an open-pit or excavation of an underground mine. Usually, according to the difference utilities of waste rock, it could be used directly or dressed to various sizes for using.

The following embodies utilization methods of waste rock:

A. A very good material for construction of roads. The coarser size waste rock can be used for Sub grade building and the fine size for road surface paving;
B. A very good material for construction of dams;
C. A very good material for beneficiating coarse and fine aggregate of concrete;
D. It could be used for making construction bricks when beneficiated to suitable size; and
E. To backfill the mined out area, subsidence area and other area needed to be filled.

2.4.2 Utilization of tailings for construction

The usages of tailings as construction material are described as following:

A. Used for making wall bricks and floor tiles for construction;
B. Used for filling depressions, the mined out area or subsidence area;
C. Used for improving of the soil; and
D. Separating out coarser size for fine aggregate of concrete and building sand usage.

2.4.3 Recycling usable minerals

With the development of mineral processing technology, it becomes possible that the usable minerals in tailings could be recycled.

2.4.4 Backfill mined out area

Waste rock and tailings could also be used in the backfill mined area of a mine in transition from open-pit to underground mining. Backfill the mined area is not only significant to the environmental restoring and improving the mining condition, but also a good idea of disposal method on solid waste from mines.

2.4.5 Regeneration of ground vegetation

The investigation result shows that vegetation planted on the surface of iron tailings was not only propitious to tranquilizing and reducing soil erosion but also enhancing growth of vegetation.

2.4.6 Producing glass or fertilizer

According to the varieties of mineral composition in tailings of different mine, tailings could be used to produce glass or fertilizer

Self-check 2	Written test

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

Say true if the statements is correct and say false if the statement is incorrect

1. Tailings are the major solid wastes produced in the process of mineral beneficiation. 2 point
2. With the development of mineral processing technology, it becomes possible that the usable minerals in tailings could be recycled. 2 point
3. When discarding your waste, find ways to recycle it instead of letting it go to landfill. 2 point
4. According to the varieties of mineral composition in tailings of different mine, tailings could be used to produce glass or fertilizer. 2 point
5. Residual wastes which cannot be used by any means should be disposed improperly. 2 point

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 3- Clearing , checking, maintaining and store Machineries, tools and equipment

3.1. Introduction

If you are mining worker, you'll be responsible for the condition of all the tools and equipment in the work site. This is a very important job. Inspect all tools as they are returned to determine if they need repairs or adjustment.

Wipe clean all returned tools and give their metal surfaces a light coat of oil. Check all precision tools upon issue and return to determine if they are accurate. Keep all spaces clean and free of dust to prevent foreign matter from getting into the working part of tools. Plan to spend a portion of each day reconditioning damaged tools. This keeps the tools available for issue and prevents an accumulation of damaged tools.

3.2 3s Approaches (Sort, Set in order and Shine)

1. Sort

- Focuses on eliminating unnecessary items from the workplace
- Categorize equipment, machine, tool in your working place into the following 3 categories

1. Necessary
2. Unnecessary

3. May not necessary

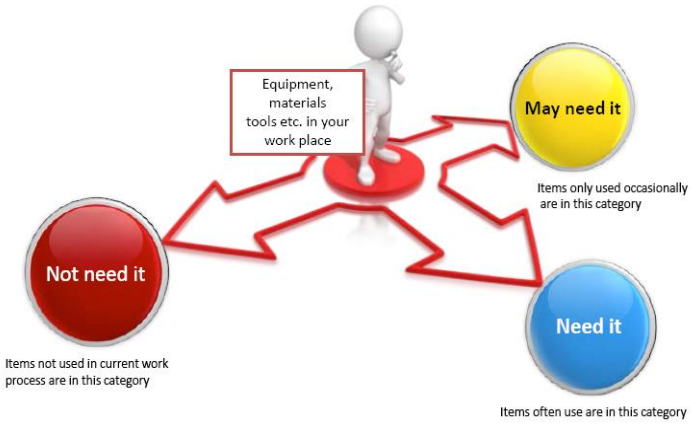


Figure- 3.1 Category of Tools

2. Set in order

- Set in order is based on finding efficient and effective storage of necessary items
- Apply “Can see, Can take out, and Can return” philosophy
- This will save time and energy to look for something

Example of “Set in order “activities

- Labeling , numbering, zoning for clear identification of storage areas to keep necessary items
- Set necessary items matching with workflow to minimize unnecessary movement and transportation time

Figure 3.2. Set In order Activity

3. Shine
    - Cleaning up one’s workplace daily so that there is no dust on floors, machines or equipment.
    - It will create ownership and build pride in the workers

Figure 3.3- Shining activities

Self-check 3	Written test

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

Say true if the statements is correct and say false if the statement is incorrect

1. If you are mining worker, you'll be responsible for the condition of all the tools and equipment in the work site. 2 point
2. Keep all spaces clean and free of dust to prevent foreign matter from getting into the working part of tools. 2 point
3. Cleaning up one's workplace daily so that there is no dust on floors, machines or equipment. 2 point
4. Shine is based on finding efficient and effective storage of necessary items. 2 point
5. Set in order focuses on eliminating unnecessary items from the workplace .2 point

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Reference Materials

1- Adedipe, N.O. The African Environment: A changing and Scary Scenario. 1992.
2- Adedipe, N.O. The African Environment: A changing and Scary Scenario. 1992.
3- Adeniyi, E.O. “Environmental Management and Development in Nigeria” A paper presented at the proceedings of a National Conference on Development and the Environment, Rosprint Industrial Press Ltd., 1986.
4- Community Services and Health Industry Skills Council**,** Commonwealth of Australia, 2012
5- Work health and safetyRegulations,2012
6- Community Services and Health Industry Skills Council**,** Commonwealth of Australia, 2012
7- Accident Prevention Manual for Business & Industry
8- Hand and portable power tool safety guidelines.
9- Occupational Safety and Health Administration John L. Henshaw, Assistant Secretary
10- Use hand and power tools **www.pertrain.com.au** Work Health and Safety Act, 2012
11- Work Health and Safety Regulations, 2012
12- Environmental management plan,2013
13- Hand and portable power tool safety guidelines,2014
14- Power tool safety
15- Transmission Line Project, Kajiado County, Kenya,2012
16- Use hand and power tools learner guide

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