



**Basic Agricultural Production and  
Natural Resources Conservation Level-I  
Based on Version-3 March 2018 OS.**

**Training Module –Learning Guide 33-36**

**Unit of Competence: Support Irrigation Work**

**Module Title: Supporting Irrigation Work**

**TTLM Code: AGR BAN1 M08 TTLM 0919v1**

**October 2019**



**Module Title: Supporting Irrigation Work**

**TTLM Code: AGR BAN1 M08 TTLM 0919v1**

**This module includes the following Learning Guides**

**LG 33: Prepare materials, tools and equipment for irrigation work**

**LG Code:-AGR BAN1 M13 LO1-LG-33**

**LG 34: Undertake irrigation work as directed**

**LG Code:-AGR BAN1 M13 LO2-LG-34**

**LG 35: Handle & clean up and store materials and equipment**

**LG Code:-AGR BAN1 M13 LO3-LG-35**

**LG 36: Complete documentation**

**LG Code:-AGR BAN1 M13 LO4-LG-36**

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<b>Instruction Sheet</b>	<b>Learning Guide # LG 33: Prepare materials, tools and equipment for irrigation work</b>
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This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Identifying materials, tools and equipment
- Checking materials, tools and equipment
- Manual handling Techniques when loading unloading materials
- Selecting and checking personal protective equipment (PPE).
- Identifying OHS requirements, hazards and workplace information

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:**

- Identify materials, tools and equipment
- Check materials, tools and equipment
- Manual handling Techniques when loading unloading materials
- Select and check personal protective equipment (PPE).

**Learning Instructions:**

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described
3. Read the information written in the information “Sheet
4. Accomplish each “Self-check respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to the next or “Operation Sheet
6. Do the “LAP test”



<b>Information Sheet-1</b>	<b>Identifying materials, tools and equipment</b>
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### **1.1. Preparing materials, tools and equipment for irrigation work.**

Irrigation systems use equipments which range from sophisticated to locally available materials. To have efficient irrigation system, we need to identify and prepare irrigation tools pre-season.

- ✓ A tool is the simplest physical aid used in agriculture. It embraces wide varieties such as we may get items of crude mature to precise and well engineered ones. e.g. The spade
- ✓ An implement is a specific type of tool much related to the power source. There is no complicated mechanism in it. It applies to any device which is relatively simple for performing a mechanical or manual operation. e.g. The traditional implement set.
- ✓ Different kinds of hoes such as pronged hoes, tined hoes, weeding hoes etc. are useful tools for hoeing. Many designs are available for hoeing and weeding with hand tools (Fig below), ranging from hoes and trowels to wheeled cultivators. Each type is recommended for a specific purpose. For example, the sod hoe which is operated by pushing with a scraping action is ideal for weeding vine crops, such as squash.

### **1.2. Identifying the required materials, *tools and equipment***

Identification of tools and equipment is about choosing the various components which make up the system. In this topic the main components are listed, and guidance is given in how to choose, for preliminary purposes, between the various options and component configurations available.

For Identification of tools and equipment to look at the following criteria

- ✓ Purposes(Work will be done )
- ✓ Available skill or required labor inputs
- ✓ Natural conditions type of crop
- ✓ previous experience with irrigation
- ✓ Costs and benefits or capital
- ✓ Etc.

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### 1.3. General Identification of materials, tools and equipment

In identification of materials, tools and equipment we have to consider materials, tools and equipment already identified and on use in nursery and gardening work but other materials, tools and equipment specifically related to irrigation technology are identified bellow



Water pump: is used for pumping water from water source to the working sit.



Hoses (sucking and discharging): it is a water media transporting water from the pump to the working place.



Water reservoir: it is water storage at working place.



Small sized (1/2 inch, 3/4 inch...) hoses for distributing water from water reservoir filled by the discharged water from water resource by pump. It is used for sparing water drops from the reservoir to the plants.



Watering can: a watering can has a vital role in ensuring the establishment of young plants of all kinds. It can also be used to apply weed killers on paths and lawns. It can be used as a substitute for a sprayer to apply insecticides too. Most watering cans are sold in a 10 litter size, which is ideal not too heavy when full. Use a watering can rose of a fine droplet size for a wider range of uses, including watering seedlings and

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applying weed killers. If the can is used frequently for weed killing, it might be advisable to have a separate can for that purpose to avoid mishaps if it not properly washed out.

#### **1.4. The common materials and tools for irrigation.**

##### Delivery system

- ✓ Mainline distribution to field - Sub- mainline
- ✓ Feeder tubes or connectors
- ✓ Drip tube or tape

##### Filters

- ✓ Sand
- ✓ Screen
- ✓ Disk

##### Pressure regulators

- ✓ Fixed outlet
- ✓ Adjustable outlet
- ✓ Valves or gauges

##### Chemical Injectors

- ✓ Positive displacement injectors
- ✓ Pressure differential injectors
- ✓ Water-powered injectors

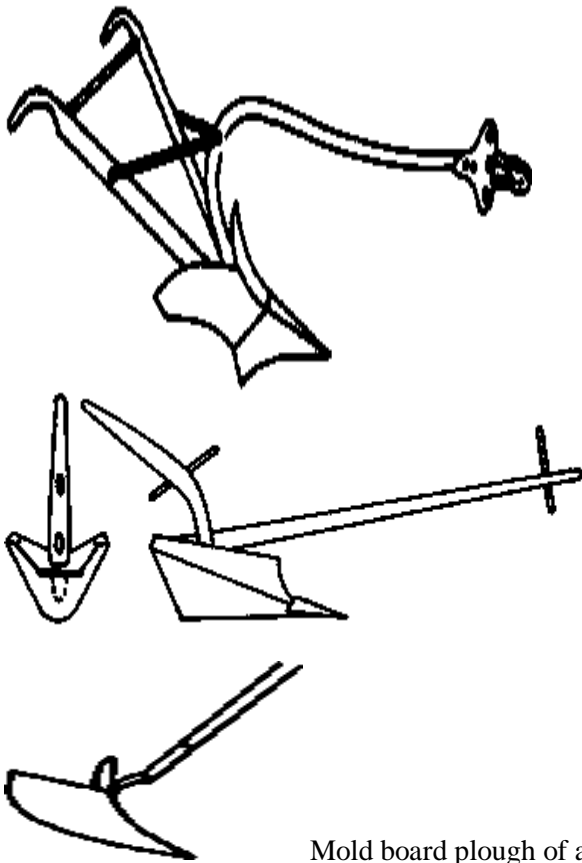
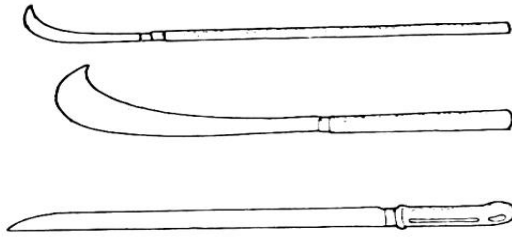
##### Controllers

- ✓ Manual
- ✓ Computer

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## Pictorial representation of some tools and equipments



Mold board plough of animal drawn

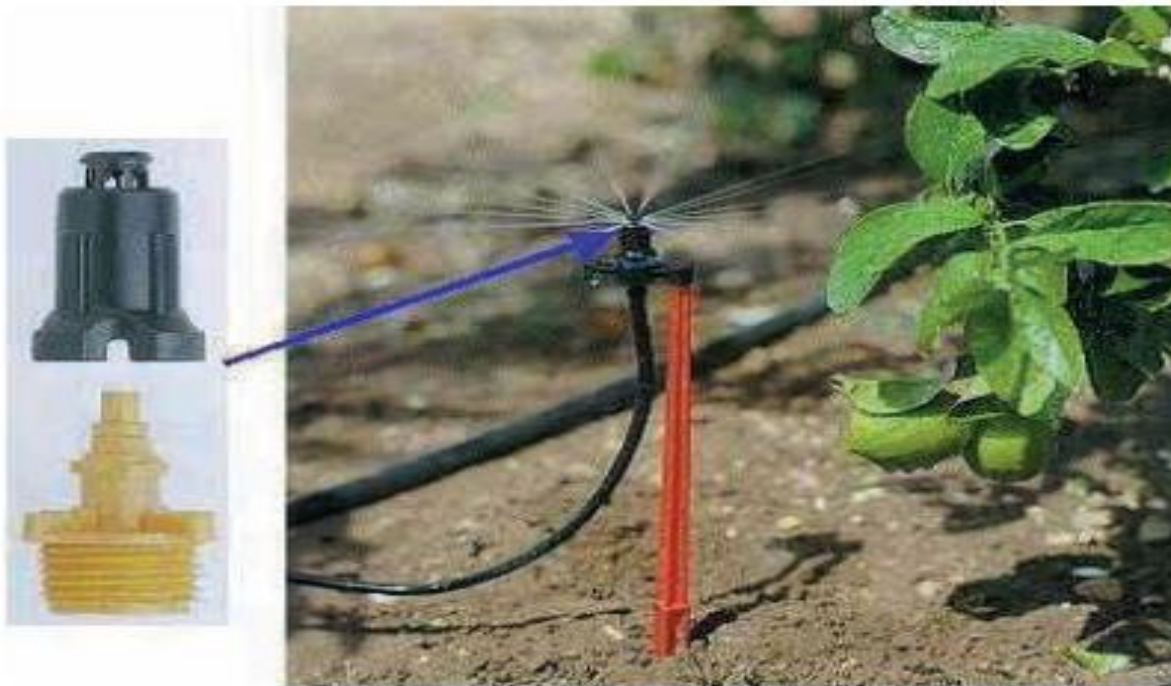


Traditional watering can

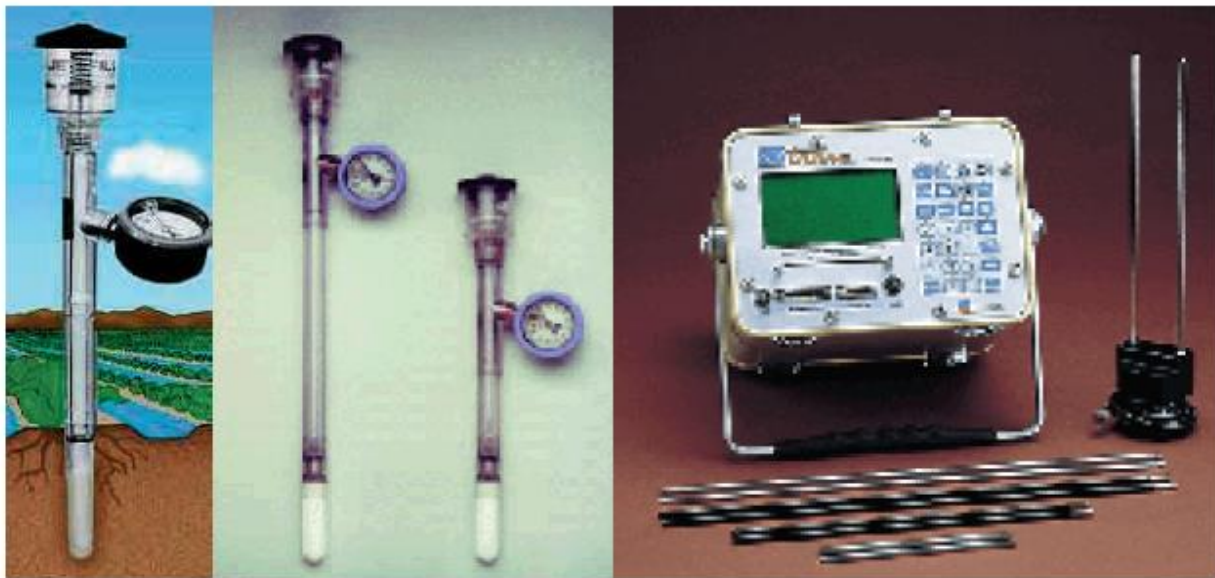


Water Pump





Micro –jet irrigation a citrus tree and detail the micro jet’s head with no moving jet



Tensiometers: - operate by allowing the soil solution to come into equilibrium with a reference pressure indicator through a permeable ceramic cup placed in contact with the soil.

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Time Domain Reflectometry.(or TDR). The method is based on the principle that velocity of an electromagnetic wave depends on the conducting medium. The larger the soil water content is, the slower the wave will travel. Thus, the wave travelling time along a probe of known length can be related to the soil water content.



Conductivity meters. These portable instruments are battery powered and enable rapid and accurate determination of the concentration of soluble salts in the soil solution and the irrigation water. They are temperature compensated but they need frequent calibration

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Evaporation pan. This is an open circular pan which is widely used to measure evaporation.

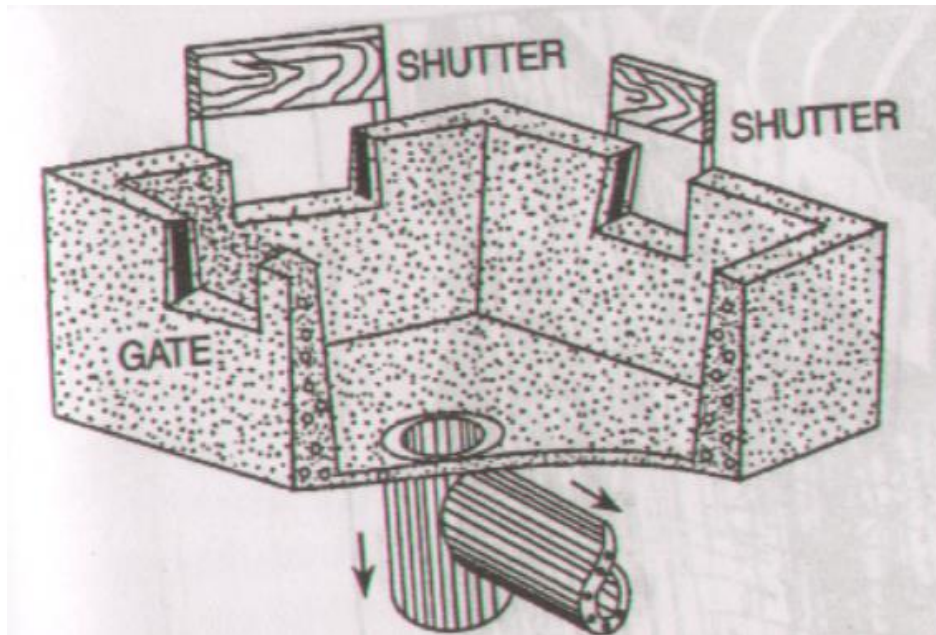
It is filled with water to 5 cm below the rim. It has a simple or advanced reading mechanism to indicate the decrease in water level due to evaporation. Measurements are recorded every morning at the same time. The water is topped up when its level drops to about 7.5 cm below the rim.







Left: a gate for a farm turnout. Right: a **Neyrpic gate**.



Multi gate water distribution

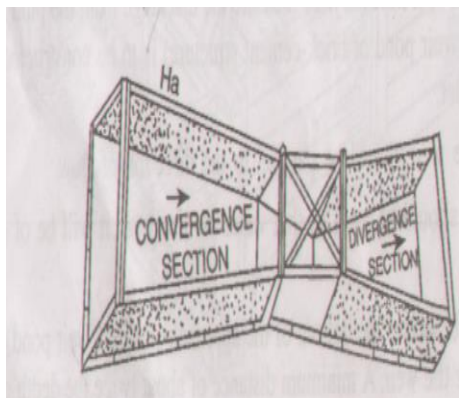
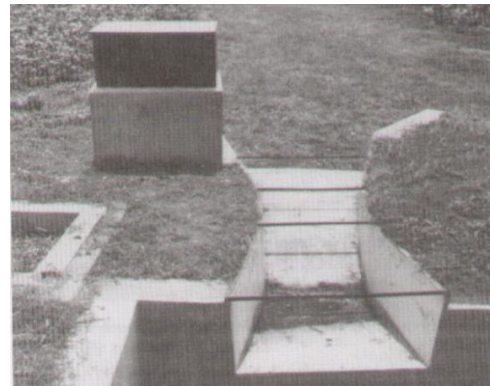
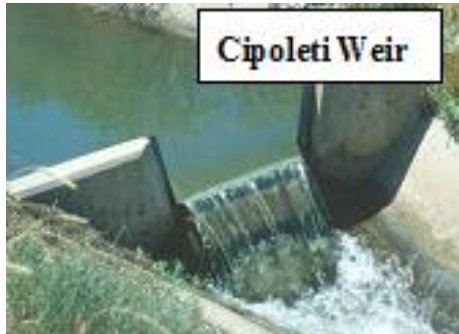
Water Control devices. In open canals, water flow is controlled with different kind of devices. The most common one are gates. Gates are used in canal turnouts. A special type is the downstream constant level gates, commonly known as Neyrpics.

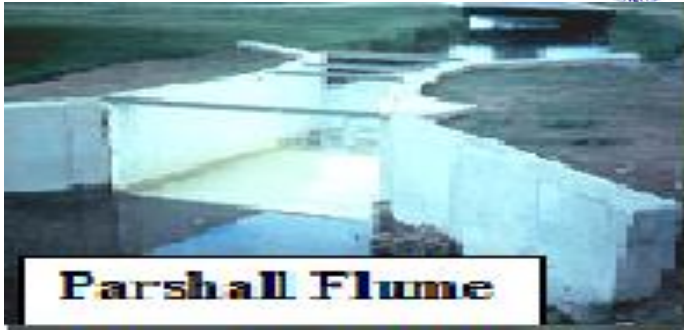
Flow measurement devices. Discharges can be measured with weirs or flumes. Weirs are sharp-crested, overflow structures that are built across open canals. The water level upstream of the structure is measured using a measuring gauge. The discharge corresponding to that water level is then read from a table which is specific for the size and type of weir being used. Flumes consist of a narrowed canal section with a particular, well-defined shape. Like measurements with weirs, the water level upstream of the flume is a measure of the discharge through the flume, and when the head has been measured the discharge can be obtained by reading the value on a diagram which is specific for the flume being used.

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## Different types of weir





Different types of flumes



Water application using gate pipe and siphon.

### **Water application devices.**

Siphons and gated pipes are commonly used in surface irrigation. A siphon is a curved pipe filled with water and laid over the channel bank at every irrigation. Gated pipes are used to control the water applied to individual furrows.

### **1.5. Identification of some tools and equipments for different types of irrigation**

#### ***Tools and equipment may include***

Leveling equipment, wheelbarrow, string lines, tape measures, marking gauges, spades, shovels, crow bars, rakes, brooms, sanding blocks and hacksaws are needed.

#### **Some of the components of drip irrigation:**

1. Water tank (Roto)
2. T-PICES
3. Connectors
4. Laterals lines
5. On-line Emitters
6. Filter
7. Drain outlet 3/4"
8. Ball valve 3/4" female
9. Comp. Elbow
10. Comp. Tee
11. Barbed Tee
12. Line end 16mm
13. Puncher 16mm
14. Puncher

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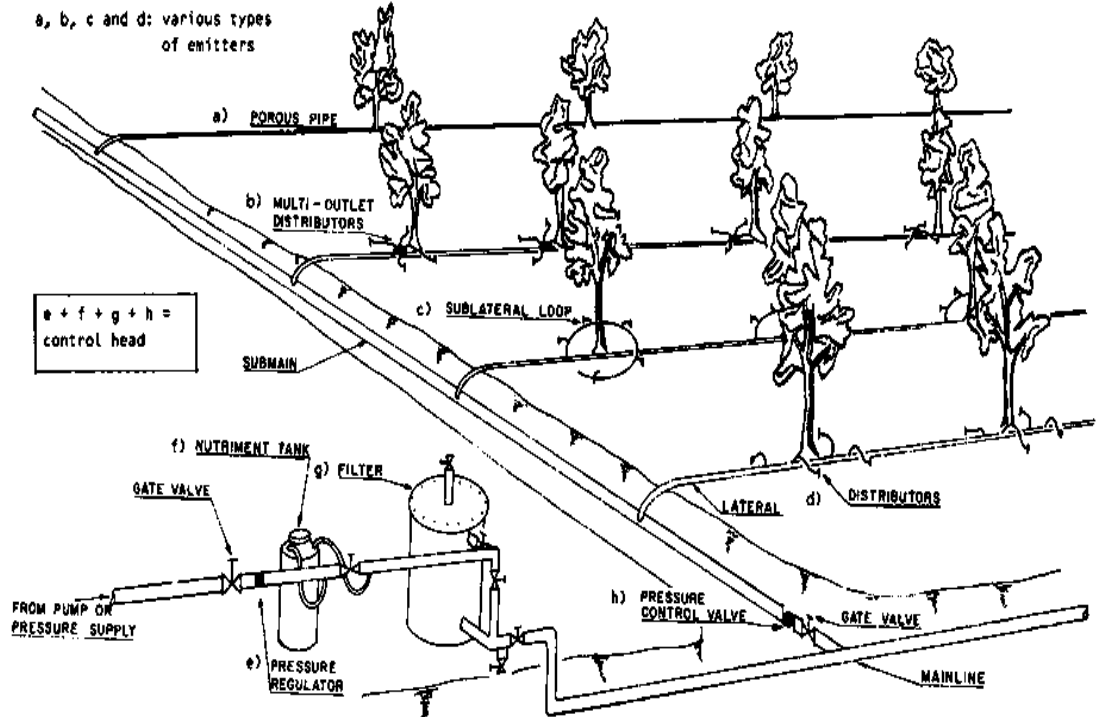


Figure:-Some of the components of drip irrigation

**Some of the components of surface irrigation**

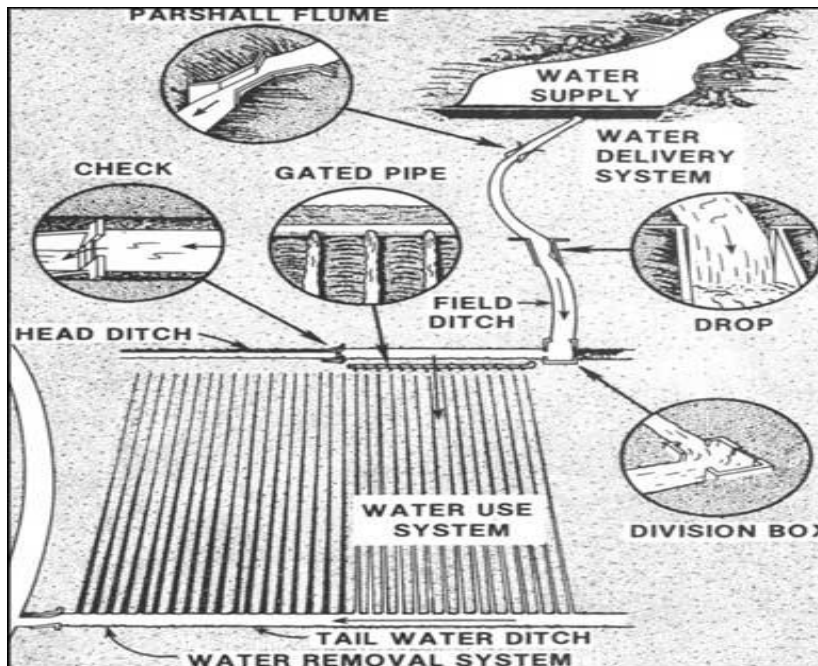


Figure: Components of surface irrigation





### ❖ Tools and equipments in sprinkler irrigation:

1. Electrical motor or Diesel engine to drive the water pump.
2. Water pump
3. Pressure gauges
4. Screen filters
5. Fertilizer applicator
6. Control valves
7. Light Aluminum or PVC pipes for mains and laterals
8. Riser pipes
9. Sprinkler heads
10. Tee couplings, Bends, End plug, etc

### Components of sprinkler irrigation

1. Pumps,
2. Supply lines,
3. Main lines,
4. Lateral lines, and
5. Risers

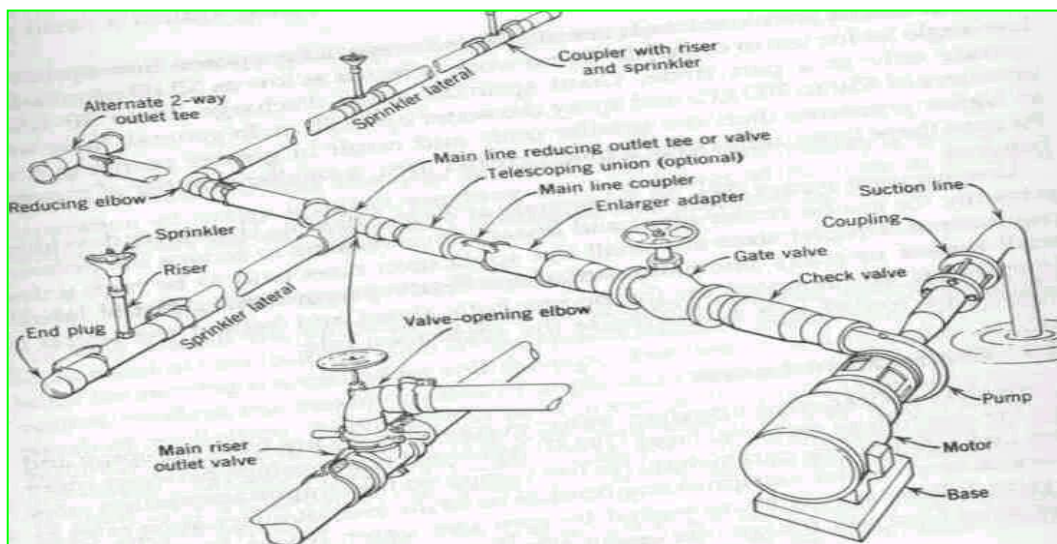


Figure: Components of sprinkler irrigation

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<b>Self-Check -1</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. \_\_\_\_\_ is the simplest physical aid used in agriculture. It embraces wide varieties such as we may get items of crude mature to precise and well engineered ones.(3 points)  
A. Equipments C.  
Local resources  
B. Tool D.  
Irrigation
2. Write Components of sprinkler irrigation.(5 points)
3. Write Components of drip irrigation(10points)
4. What are water applicant devices(2points)
5. What is water cane (2points)

**Note: Satisfactory rating - 11 points and above**

**Unsatisfactory - below 11 points**

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

**Answer Sheet**

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_

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## Short Answer Questions

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<b>Information Sheet- 2</b>	<b>Checking materials, tools and equipment</b>
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### **2.1. Purpose of checking materials, tools and equipments.**

In supporting irrigation work, materials tools and equipments selected should be checked before and after usage. Checking materials, tools and equipment before usage is very important. Because of the quality and capacity of each and individual item will be determine the efficiency, effectiveness and productivity of the target to be implemented. And it is also highly contributes to safe work condition to the workers. In relation to reporting tools, material and equipment technician on irrigation work should inspect all require type of materials, tools and equipment, either their amount in kind, their quality of performing the required operation, their existing condition (damaged, mint for maintenance, replace what is lost, and what is purchased and other related situations should be reported to the nearest supervisor before, during and after the completion of irrigation. Because irrigation work highly will be influenced by effective and efficient supply of materials, tools and equipment selected to conduct the task.

### **2.2. Conducting Checks on all materials, tools and equipment**

It is essential to check irrigation system, tools and equipments for damage or malfunction and shall report damage or malfunction to the authorized representative in writing. If failed to maintain the broken or malfunctioning irrigation system components within few days of the breakage or malfunction, there will be a loss due to damages resulting from the broken irrigation system component.



Hence, it is necessary to check the system, materials and equipments. In addition, maintenance of the system has to be carried out regularly.

- ✓ Do not begin construction of the irrigation system without having the meter taps installed.
- ✓ Read and fully understand the irrigation standard details and technical specs.
- ✓ Do not deviate from the details without the written consent of field services or designee. All changes must be initialed, signed, dated, and noted on plan.
- ✓ If you are unsure about any of the provisions in these specifications, contact a representative from Field Services for clarification. This may require an onsite meeting.

**Irrigation System Scheduled Maintenance and check:**

- ✓ Each valve zone shall be observed for signs of damage on a weekly basis during the irrigation season.
- ✓ The landscape maintenance worker shall maintain the irrigation system, including cleaning of filter screens yearly or more often as needed, and flushing pipes, as part of this contract.
- ✓ Drip irrigation systems need periodic flushing to remove sediment. When flushing is necessary, it shall be performed as part of this contract. Drip systems shall be flushed at least once a year. Open ends of drip lines and run for at least 15 minutes at full flow to flush. It may be necessary to install flush outlets in order to flush the drip system.
  
- ✓ Run-off of water from irrigation systems into or onto streets, sidewalks, stairs, or gutters is not permitted. The contractor shall immediately shut down the irrigation system and make adjustments, repairs, or replacements as soon as possible to correct the source of the run-off.

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<b>Self-Check -2</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. write Irrigation System Scheduled Maintenance and checks(6points)

**Note: Satisfactory rating - 3 points**

**Unsatisfactory - below 3 points**

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

### Answer Sheet

Score = \_\_\_\_\_

Rating: \_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Short Answer Questions

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<b>Information Sheet- 3</b>	<b>Manual handling Techniques when loading unloading materials</b>
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### **3.1. Techniques used when loading and unloading materials**

The techniques used when loading and unloading materials should demonstrate correct manual handling and minimize damage to the load and the vehicle while transporting irrigation equipments.

**The most common techniques of loading and unloading materials use the following guidelines:**

- Develop an operations plan that describes procedures for loading and/or unloading.
- Conduct loading and unloading in dry weather if possible.
- Cover designated loading/unloading areas to reduce exposure of materials to rain.
- Consider placing a seal or door skirt between delivery vehicles and building to prevent exposure to rain.
- Design loading/unloading area to prevent storm water run-on, which would include grading or berming the area, and position roof downspouts so they direct storm water away from the loading/unloading areas.
- Have employees load and unload all materials and equipment in covered areas such as building overhangs at loading docks if feasible.
- Load/unload only at designated loading areas.
- Use drip pans underneath hose and pipe connections and other leak-prone spots during liquid transfer operations, and when making and breaking connections. Several drip pans should be stored in a covered location near the liquid transfer area so that they are always available, yet protected from precipitation when not

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in use. Drip pans can be made specifically for railroad tracks. Drip pans must be cleaned periodically, and drip collected materials must be disposed of properly.

- Pave loading areas with concrete instead of asphalt.
- Avoid placing storm drains in the area.
- Grade and/or berm the loading/unloading area to a drain that is connected to a dead end.

### **Inspection**

- Check loading and unloading equipment regularly for leaks, including valves, pumps, flanges and connections.
- Look for dust or fumes during loading or unloading operations.

<b>Self-Check -3</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Identifying the techniques used when loading and unloading materials (10points)

**Note: Satisfactory rating – 5 points and above**

**Unsatisfactory - below 5points**

### **Answer Sheet**

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_





<b>Information Sheet-4</b>	<b>Selecting and checking personal protective equipment (PPE).</b>
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#### 4.1. Definition of personal protective equipments

Any irrigation activity that requires squirting, spraying, or pressure release of fluid requires personal protective equipment that includes gloves, gown, mask with eye shield to prevent exposure to debris and aerosolization of microorganisms. Splash shield devices will still require wearing of gowns, and face protection due to splash potential.

**Personal protective equipment (PPE):-** is used to protect an individual from hazards associated with their work tasks or environment. Specific types of personal protective equipment include protective clothing, eyewear, respiratory devices, protective shields, gloves, and hearing protection. Personal protective equipment is not a substitute for engineering controls such as chemical fume hoods and bio safety cabinets, or for administrative controls and good work practices. PPE is used in conjunction with these controls to provide safety and maintain health

#### General Types of PPE

- Protective glove
- Protective clothing
- Protective footwear
  
- Safety spectacles

#### Here are some examples of PPE for gardening work



**Footwear:** - Apart from saving your casual shoes or trainers from getting dirty or damaged, having a pair of heavy duty shoes or boots will also protect your feet from stones,

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falling items or tools, so it's worth investing in a sturdy pair of gardening shoes or wellington boots.



### **Gardening Gloves**

A pair of gardening gloves is a must to keep your hands protected from cuts and abrasions. There are many varieties available from light-weight cotton gloves to thick waterproof heavy duty gloves so it may be worth investing in a pair of each type.

👤 **Work wear:** - This cloth is a type of cloth which covers all the body part except the head and the fingers. It's used to protect the body from dirty



**Sun hat:** is the material that is used to protect head from direct sun radiation

### **Some of the commonly used PPE include the following:**

#### ➤ **Eye protection**

- It is required to use eye protection equipments like goggle, eye shield, to protect our eye from dusts, chemicals, etc by all workers engaged in hazardous activities or are exposed to identified eye hazards;

#### ➤ **Hand Protection (gloves)**

- It is required to use appropriate hand protection when hands are exposed to hazards, such as:
  - Skin absorption from harmful substances;
  - Cuts, lacerations or abrasions;
  - Chemical exposure;
  - Thermal burns and/or temperature extremes

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- Potentially infectious material.

➤ **Body Protection**

- Chemical Resistant Clothing: Protective apparel and apron designed to provide a barrier against a variety of chemical hazards. Chemical resistive clothing may be required for tasks where chemical splashing is anticipated or large volume transfers are conducted. Prior to selection of chemical resistant clothing, EH&S should be consulted;

➤ **Laboratory Apparel and Scrub Suits:** A wide variety of styles and materials are available to protect employees during laboratory operations. The selected type of lab coat or other apparel is designed to protect the wearer against accidental splashes or day-to-day handling of chemicals;

➤ **Clean room Apparel:** Clean room apparel is designed and classified to meet federal requirements for the control of airborne particles;

➤ **Overalls**

➤ **Ear and Hearing Protection**

Ear plugs and muffs are available for any employee potentially exposed to noise levels.

➤ **Respiratory Protection**

➤ **Steel capped boots/shoes,**

➤ **Sun hat**

➤ **Sunscreen lotion**

➤ **Face mask**

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<b>Self-Check -4</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define personal protective equipments(PPE).(2points)
2. Write some of the commonly used PPE.(5points)
3. What are the benefits to wear hand protection.(3points)

**Answer Sheet**

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_



<b>Information Sheet- 5</b>	<b>Identifying OHS requirements, hazards and workplace information</b>
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### **5.1. Providing Irrigation support according to *OHS requirements* and according to *workplace information***

Environmental and health requirements must be taken into account when treated wastewater is the source of irrigation water.

A lack of corporate commitment to health and safety will result in OHS remaining a marginalized and insufficiently funded workplace irrigation activity. A six point approach has been devised to help you implement effective occupational health and safety systems. This plan can help prevent accidents, incidents, injuries, and irrigation work-related ill health. The six points are:

- ✓ Develop locally fit and properly implement an OHS policy and related programs;
- ✓ Set up a consultation mechanism;
- ✓ Establish a training strategy;
- ✓ Establish a hazard identification and workplace assessment process;
- ✓ Develop and implement risk control.
- ✓ Promote, maintain and improve these strategies;

These points are not necessarily in order because all workplaces are different. Some of you may want to repeat some of the steps at different stages. It is important however, that all six steps are included in your occupational health and safety strategy. The six points are outlined in more detail below.

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<b>Self-Check -5</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

2. write the six points that prevents accident, injuries, and irrigation work related (10points)

**Note: Satisfactory rating – 5 points and above**

**Unsatisfactory - below 5points**

**Answer Sheet**

Score = \_\_\_\_\_

Rating: \_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

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**Operation Sheet 1****Prepare materials, tools and equipment for irrigation work**

**1.1. The following general tools and equipments used in the construction of different methods of irrigation will be identified:**

- 1.Leveling equipment,
- 2.Wheelbarrow,
- 3.String lines,
- 4.Tape measures,
- 5.Marking gauges,
- 6.Spades,
- 7.Shovels,
- 8.Crow bars,
- 9.Rakes,
10. Brooms,
- 11.Sanding blocks and
- 12.Hacksaws.

➤ **The following components of drip irrigation drip irrigation will be identified:**

- 1.Water tank (Roto)
- 2.T-PICES
- 3.Connectors
- 4.Laterals lines
- 5.On-line Emitters
- 6.Filter
- 7.Drain outlet 3/4"
- 8.Ball valve 3/4" female
- 9.Comp. Elbow
- 10.Comp. Tee
- 11.Barbed Tee



12.Line end 16mm

13.Puncher 16mm

➤ **The following components of surface irrigation will be identified:**

- 1.Parshall flume,
- 2.Check,
- 3.Gated pipe,
- 4.Water supply,
- 5.Water delivery system,
- 6.Field ditch,
- 7.Head ditch,
- 8.Drop,
- 9.Division box,
- 10.Water use system, and
- 11.Water removal system.

➤ **The following tools and equipments in sprinkler irrigation will be identified:**

- 1.Electrical motor or Diesel engine to drive the water pump.
- 2.Water pump
- 3.Pressure gauges
- 4.Screen filters
- 5.Fertilizer applicator
- 6.Control valves
- 7.Light Aluminum or PVC pipes for mains and laterals
- 8.Riser pipes
- 9.Sprinkler heads
- 10.Tee couplings, Bends, End plug.

➤ **The following components of sprinkler irrigation will be identified:**

- 1.Pumps,
- 2.Supply lines,
- 3.Main lines,
- 4.Lateral lines, and

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5.Riser.

<b>Operation Sheet 2</b>	<b>Manual handling Techniques when loading unloading materials</b>
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**The most common techniques of loading and unloading materials use the following guidelines:**

- Develop an operations plan that describes procedures for loading and/or unloading.
- Conduct loading and unloading in dry weather if possible.
- Cover designated loading/unloading areas to reduce exposure of materials to rain.
- Consider placing a seal or door skirt between delivery vehicles and building to prevent exposure to rain.
- Design loading/unloading area to prevent storm water run-on, which would include grading or berming the area, and position roof downspouts so they direct storm water away from the loading/unloading areas.
- Have employees load and unload all materials and equipment in covered areas such as building overhangs at loading docks if feasible.
- Load/unload only at designated loading areas.
- Use drip pans underneath hose and pipe connections and other leak-prone spots during liquid transfer operations, and when making and breaking connections. Several drip pans should be stored in a covered location near the liquid transfer area so that they are always available, yet protected from precipitation when not in use. Drip pans can be made specifically for railroad tracks. Drip pans must be cleaned periodically, and drip collected materials must be disposed of properly.
- Pave loading areas with concrete instead of asphalt.
- Avoid placing storm drains in the area.

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- Grade and/or berm the loading/unloading area to a drain that is connected to a dead end.

### ***Inspection***

- Check loading and unloading equipment regularly for leaks, including valves, pumps, flanges and connections.
- Look for dust or fumes during loading or unloading operations.

<b>LAP Test</b>	<b>Practical Demonstration</b>
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Name: \_\_\_\_\_ Date: \_\_\_\_\_

Time started: \_\_\_\_\_ Time finished: \_\_\_\_\_

**Instructions:** Given necessary templates, tools and materials you are required to perform the following tasks within 8-12 hours.

**Task 1:** Identify the materials tools, and equipments for irrigation.

**Task 2:** List the components of drip irrigation system

**Task 3:** list the components of sprinkler irrigation system



<b>Instruction Sheet</b>	<b>Learning Guide # 34 undertake irrigation work as directed</b>
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This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- following Instructions and directions
- undertaking Irrigation work in a safely
- carryout Interactions with other staffs and customers
- observing Enterprise policy and procedures

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 Instructions and directions
- undertake Irrigation work in a safely
- carryout Interactions with other staffs and customers
- observe Enterprise policy and procedures

**Learning Instructions:**

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described
3. Read the information written in the information “Sheet
4. Accomplish each “Self-check respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to the next or “Operation Sheet
6. Do the “LAP test”

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<b>Information Sheet- 1</b>	<b>following Instructions and directions</b>
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## 1.2. Providing instructions and directions by supervisors

All irrigation installations and repairs are to be made under the direct supervision of a licensed irrigator or irrigation technician.

The main areas where irrigation assistance at the farm level is needed are:

- ❖ Advice to farmers on how to improve their irrigation practices and to establish irrigated crops,
- ❖ assistance to farmers in improving the farm layout, and
- ❖ Encouragement for farmers to organize themselves into groups for the operation and maintenance of the tertiary systems and their improvement when needed.

A potential Irrigation Assistance Service (IAS) can therefore be engaged in numerous different activities depending on the particular needs of the irrigation scheme.

In countries where on-farm developments are somewhat disregarded, the tendency should be for the IAS to concentrate first on designing a suitable farm layout and supervising its construction; and then at the second stage, to give greater weight to assistance on irrigation practices.

In countries where the on-farm layout is part of the whole irrigation development process, the emphasis should be on helping the farmer to use suitable irrigation techniques, particularly scheduling of the irrigation water.

Lastly, in irrigation schemes constructed long ago where experience is good with irrigated agriculture and the farm layouts are appropriate, the greater need would be to identify the areas where rehabilitation of the tertiary system is necessary, followed by better organization of the farmers to distribute the water and operate the system.

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There are also other instances in which all these factors (farm layout, irrigation practices and tertiary canal system) may be satisfactory and there is no reason for an IAS, in which case, but this is unfortunately the rarest, ad hoc traditional extension services may suffice to cover the needs of the farmers, provided that they have staff knowledgeable on water issues.

Therefore irrigation assistance at the farm level can be channeled in the three ways already

Mentioned and which, for reasons of easy reference, can be called:

- i. Irrigation practices improvement,
- ii. On-farm development, and
- iii. Tertiary canal system improvement.

### ***Main activities***

Before any on-farm development assistance takes place, a brief review should be made of the elements that constitute the farm layout. They may already exist or have to be added, depending on the complexity desired. The elements of the farm layout are the following in the most complex case:

- i. Intake (one or several),
- ii. Head-farm ditches,
- iii. Water retention structures (checks),
- iv. Land preparation for the irrigation method (furrow, border, basin, contour furrows, contour border), and related land grading,
- v. Drains collecting tail water,
- vi. Farm drain
- vii. Location and layout of the family orchard,
- viii. Fences (mainly in case of livestock),
- ix. Watering facilities for livestock
- x. Tail water ponds and reuse facilities.

#### **If the house is located within the farm:**

- i. Location of the house and distribution of farm dependencies,
- ii. Access to the house, and

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iii. Water supply and sanitation

**To improve the irrigation and drainage layout of the farm and to prepare for suitable land grading, the following actions must be taken**

- The farmer's concurrence sought for any works to be done,
- Detailed topographic survey made of the farm (scale 1:1000),
- Data collected on soil characteristics and intended cropping pattern,
- The future layout designed in full cooperation with the farmer,
- The planned work should be undertaken as far as possible with the farmer's working means, or else with the machinery of the programmed.

***In summary supervisors must***

- ❖ Ensure they provide leadership and set a good example for staff and students in occupational health and safety matters.
- ❖ Ensure they consult with the staff and students they supervise to identify, assess and control OHS risks in accordance with the OHSRM Program.
- ❖ Ensure that safe working practices are developed and maintained at all times.

Arrange for their staff and students to be instructed in safe and healthy working procedures, warned about particular hazards, and told how to avoid, eliminate or minimize them.

**Coordinating**

This important stage consists of inter relating the various parts of the work. It involves coordinating the various job roles and responsibilities of yourself and other staff, of your unit and other units within the same organization, and of your unit with the broader community.

There are two forms of coordination:

(1) Vertical reporting to your supervisor(s) and to your staff, and

(2) Horizontal reporting to your colleagues and your management team.

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Adult and extension educators are usually involved in very complex organizations such as governments, colleges and universities, and boards of education. Because of the size of the organization, the increasing demands for public accountability, the many government regulations and policies, the increasing competition among providers of adult education opportunities, and the changes in technology, it is essential that the coordinating role be given top priority. How, then, can effective coordination be accomplished?

- ❖ Coordination needs professional, competent leadership, a democratic style that leads to trust, open communication, and ease of information flow.
- ❖ Coordination needs a constant definition and communication of mission and objectives that are understood by all managers.
- ❖ Coordination, to be effective, must have open, two-way channels of communication. Coordination involves a sharing atmosphere as well as commonly agreed on direction. Because effective coordination requires cooperation and communication, the meeting technique is still the most effective format for assuring the interrelationships among the various job responsibilities.
- ❖ In recent years, formal systems of community coordination of adult and extension education activities have been developed. Such councils of continuing education provide more than just a network of workers but in fact lead to discussions of community needs, agency priorities, and an agreement as to who is going to look after what. Such voluntary coordination does not eliminate competition; it focuses on the multi way flow of information

## Reporting

This function, closely related to the coordinating function, consists of keeping those to whom you are responsible informed as to what is going on. It is essential that competent managers keep the information flowing, especially in this age when there is so much information being transmitted in so many forms. The reporting function is more

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than preparing an annual report, quoting statistics, and informing your staff of current developments. The reporting function is almost an evaluation function since it compares how you are doing with what you set out to do. It reviews your objectives and determines to what extent you are meeting your objectives. It consists of more than course numbers or annual statistics, but relates program direction, policy changes, refinement in objectives, and changes in structures and priorities. It also uses the vertical and horizontal flows of information as presented previously.

One of the key elements of the reporting function is the annual report. Such a report gives you the opportunity to summarize programmers', projects, and activities and to provide statistics as well. Such a report can be used as a public information document by having it distributed to other adult education agencies in the community, to your senior levels of management, to your own managers, to your colleagues, and to the press. In addition, it will prove to be a valuable document to satisfy the requests you receives asking about your program activities.

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<b>Self-Check -1</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. write the two forms of coordinating.(5points)
2. write the farm level channels for irrigation assistance(5points)

**Note: Satisfactory rating - 5points and above**

**Unsatisfactory - below 5 points**

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

### Answer Sheet

Score = \_\_\_\_\_

Rating: \_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Short Answer Questions

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<b>Information Sheet- 2</b>	<b>undertaking Irrigation work in a safely</b>
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Irrigation is the artificial application of water to land. Some land requires irrigation before it is possible to use it for agricultural purposes in general and to assure sustained high-level production of crops in particular.

Surface irrigation is the application of water by gravity flow to the surface of the field. Either the entire field is flooded (basin irrigation) or the water is fed into small channels (furrows) or strips of land (borders).

- Basins are flat areas of land, surrounded by low bunds
  - Furrows are small channels, which carry water down the land slope between the crop rows.
  - Borders are long, sloping strips of land separated by bunds. They are sometimes called border strips
- It is used to assist in the growing of agricultural crops, maintenance of landscapes, and revegetation of disturbed soils in dry areas and during periods of inadequate rainfall.
- Additionally, irrigation also has a few other uses in crop production, which include protecting plants against frost suppressing weed growing in grain fields and helping in preventing soil consolidation.
- In contrast, agriculture that relies only on direct rainfall is referred to as rain-fed or dry land farming.
- Irrigation is often studied together with drainage, which is the natural or artificial removal of surface and sub-surface water from a given area.

Irrigation is the application of water to soil for the purpose of supplying the moisture essential for plant growth. Irrigation plays a vital role in increasing crop yields and

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stabilizing production. Irrigation work requires support to be effective and efficient. At the farm level,

The following basic conditions should be met to make irrigated farming a success:

- The required **amount** of water should be applied;
- The water should be of acceptable **quality**;
- Water application should be properly **scheduled**;
- Appropriate irrigation **methods** should be used;
- salt accumulation in the root zone should be prevented by means of **leaching**;
- the rise of water table should be controlled by means of appropriate **drainage**;
- Plant **nutrients** should be managed in an optimal way.

The above requirements are equally applicable when the source of irrigation water is treated wastewater. Nutrients in municipal wastewater and treated effluents are a particular advantage of these sources over conventional irrigation water sources and supplemental fertilizers are sometimes not necessary.

### **Purpose**

- ✓ Raise a crop where nothing would grow otherwise (e.g., desert areas)
- ✓ Grow a more profitable crop (e.g., alfalfa vs. wheat)
- ✓ Increase the yield and/or quality of a given
- ✓ crop (e.g., fruit)
- ✓ Increase the aesthetic value of a
- ✓ landscape (e.g., turf, ornamentals)
- ✓ Reasons for yield/quality increase
- ✓ Reduced water stress
- ✓ Better germination and stands
- ✓ Higher plant populations
- ✓ More efficient use of fertilizer
- ✓ Improved varieties

### **Other Benefits of Irrigation**

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- ✓ Leaching of salts
- ✓ Frost protection
- ✓ Plant/soil cooling
- ✓ Chemical application
- ✓ Wind erosion control
- ✓ Waste disposal

Basically in undertaking irrigation works, instruction and direction knowledge will reflect the operation of water diversion and make trainee know how to apply the right amount of irrigation water to any greenery plants and get acquainted with the use of different irrigation methods, structures and equipments available in an irrigation scheme. All instructions and directions will be provided by supervisor with clarifications. Related to the above operation and tasks principles and components systems should be clarified as below

### **Components we mean:**

- A. Gravitational irrigation system: in this system there are about two methods should be known like:
- Surface irrigation method where the irrigated water will be drained in the form of basin, furrow, border...
  - Sub surface irrigation method also the other one
- B. Pressurized irrigation systems: in this system equipment like pumps and water spreading devices will be used. These items are all technological and mechanical are able to suck water and generating pressure for water spreading operation. This system will be implemented in the following two manners:
- Sprinkler irrigation is similar to natural rainfall. Water is pumped through a pipe system and then sprayed onto the crops through rotating sprinkler heads.

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- Drip irrigation water is conveyed under pressure through a pipe system to the fields, where it drips slowly onto the soil through emitters or drippers which are located close to the plants. Only the immediate root zone of each plant is wetted.

The first one is simply spreading water over the field in the form of rain drops and drip irrigation will spread in the form of drops close to the land surface

## **BASIN IRRIGATION**

**Suitable crops:** - is suitable for many field crops. Paddy rice grows best when its roots are submerged in water and so basin irrigation is the best method to use for this crop

Other crops which are suited to basin irrigation include: -

Pastures, e.g. alfalfa, clover; -

Trees, e.g. citrus, banana;-

Crops which are broadcast, such as cereals; -

To some extent row crops such as tobacco.

Basin irrigation is generally not suited to crops which cannot stand in wet or waterlogged conditions for periods longer than 24 hours. These are usually root and tuber crops such as potatoes, cassava, beet and carrots which require loose, well-drained soils.

## **Suitable land slopes**

The flatter the land surface, the easier it is to construct basins. On flat land only minor leveling may be required to obtain level basins. It is also possible to construct basins on sloping land, even when the slope is quite steep. Level basins can be constructed like the steps of a staircase and these are called terraces.

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## **BASIN SIZE**

The size of basins depends not only on the slope but also on the soil type and the available water flow to the basins.

**BASINS SHOULD BE SMALL IF THE:**

- slope of the land is steep
- soil is sandy
- stream size to the basin is small
- required depth of the irrigation application is small
- Field preparation is done by hand or animal traction.

**BASINS CAN BE LARGE IF THE:**

- Slope of the land is gentle or flat
- Soil is clay
- Stream size to the basin is large
- Required depth of the irrigation application is large
- Field preparation is mechanized.

## **Basin Construction**

The following steps are involved in the construction of basins: setting out; forming the bunds; and smoothing the land within the basins.

### **Step 1: Setting Out**

Before construction can begin the location of the basins and bunds must be set out on the ground. This can be done using pegs, string lines or chalk powder to mark the lines of the bunds.

### **Step 2: Forming the bunds**

Both temporary and permanent bunds can be formed by hand labor or by animal or tractor powered equipment. When soil is gathered from an area close to the bund a 'borrow-furrow' is formed. This furrow can be smoothed out later or be used as a farm channel or drain.

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### Step 3: Smoothing the land

This can be the most difficult part of basin construction and involves very careful leveling of the land within each basin.

On flat land this involves smoothing out the minor high and low spots so that the differences in level are less than 3 cm. This can be done by hand or by a tractor-drawn land plane depending on the size of the basin. However, 3 cm level differences are almost impossible to judge by eye and only when applying water will it become obvious where high and low spots still exist. Thus several attempts may be required to correct the leveling.

Leveling rice basins can be much simpler. These are first cultivated and then filled with water. As the water surface is level, it will be obvious where the high spots are. These can be smoothed out and the water in the basin gradually lowered to reveal other high areas. The smoothing is usually done by an animal or tractor drawn float. This method of smoothing usually destroys the soil structure. This is not a problem when growing rice, but it is not a recommended procedure for other crops.

### Maintenance of Basins

Bunds are susceptible to erosion which may be caused by, for example, rainfall, flooding or the passing of people when used as footpaths. Rats may dig holes in the sides of the bunds. It is therefore important to check the bunds regularly, notice defects and repair them instantly, before greater damage is done. Before each growing season, the basins should be checked to see that they remain level. During pre-irrigation it can easily be seen where higher and lower spots are; these should be smoothed out.

## FURROW IRRIGATION

### Suitable crops

Furrow irrigation is suitable for many crops, especially row crops. Crops that would be damaged if water covered their stem or crown should be irrigated by furrow.

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Furrow irrigation is also suited to the growing of tree crops. In the early stages of tree planting, one furrow alongside the tree row may be sufficient but as the trees develop then two or more furrows can be constructed to provide sufficient water. Sometimes a special zigzag system is used to improve the spread of water.

in summary, the following crops can be Irrigated by furrow irrigation:- row crops such as maize, sunflower, sugarcane, soybean;- crops that would be damaged by inundation, such as tomatoes, vegetables, potatoes, beans;- fruit trees such as citrus, grape;- broadcast crops (corrugation method) such as wheat.

### **Suitable slopes**

Uniform flat or gentle slopes are preferred for furrow irrigation. These should not exceed 0.5%. Usually a gentle furrow slope is provided up to 0.05% to assist drainage following irrigation or excessive rainfall with high intensity.

### **Suitable soils**

Furrows can be used on most soil types. However, as with all surface irrigation methods, very coarse sands are not recommended as percolation losses can be high. Soils that crust easily are especially suited to furrow irrigation because the water does not flow over the ridge, and so the soil in which the plants grow remains friable.

### **Furrow Layout**

#### **Furrow length**

Furrows must be on consonance with the slope, the soil type, the stream size, the irrigation depth, the cultivation practice and the field length

#### **Furrow shape**

The shape of furrows is influenced by the soil type and the stream size

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## Furrow spacing

The spacing of furrows is influenced by the soil type and the cultivation practice

## Furrow Construction

The most common way to construct furrows is with a ridger.

## CONSTRUCTION OF FURROWS ON FLAT OR MILDLY SLOPING LAND

The following steps are taken to construct furrows:

1. Setting out; forming one (or more) ridge(s); line is set out in the field along the proposed line of furrows. This can be done by setting up ranging poles or marking a line on the ground with chalk powder or small mounds of earth straight an experienced ploughman should be able to plough along the line by aligning the poles or earth mounds.
2. Forming one (or more) the ridger is moved along the line. The resulting furrow should be straight. If not, the area should be ploughed again and the procedure repeated.
3. Parallel ridge(s). About every five (5) meters, a new straight line should be set out. If a ridger drawbar connected with a tractor is used, four furrows can be drawn simultaneously.

## Maintenance of Furrows

After construction the furrow system should be maintained regularly; during irrigation it should be checked if water reaches the downstream end of all furrows. There should be no dry spots or places where water stays bonding.

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## **BORDER IRRIGATION**

**Suitable slopes:** Border slopes should be uniform, with a minimum slope of 0.05% to provide adequate drainage and a maximum slope of 2% to limit problems of soil erosion.

**Suitable soils:** Deep homogenous loam or clay soils with medium infiltration rates are preferred. Heavy, clay soils can be difficult to irrigate with border irrigation because of the time needed to infiltrate sufficient water into the soil. Basin irrigation is preferable in such circumstance

**Suitable crops:** Close growing crops such as pasture or alfalfa are preferred.

### **Border Layout**

The dimensions and shape of borders are influenced in much the same way as basins and furrows by the soil type, stream size, slope, irrigation depth and other factors such as farming practices and field or farm size.

### **Maintenance of Borders**

Maintenance of borders consists of keeping the border free from weeds and uniformly sloping. Whatever damage occurs to the bunds must be repaired and the field channel and drains are to be weeded regularly. By checking frequently and carrying out immediate repairs where necessary, further damage is prevented.

## **SPRINKLER IRRIGATION**

**Suitable crops** Sprinkler irrigation is suited for most row, field and tree crops and water can be sprayed over or under the crop canopy. However, large sprinklers are not recommended for irrigation of delicate crops such as lettuce because the large water drops produced by the sprinklers may damage the crop.

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**Suitable slopes** Sprinkler irrigation is adaptable to any farmable slope, whether uniform or undulating. The lateral pipes supplying water to the sprinklers should always be laid out along the land contour whenever possible. This will minimize the pressure changes at the sprinklers and provide a uniform irrigation.

**Suitable soils** Sprinklers are best suited to sandy soils with high infiltration rates although they are adaptable to most soils. The average application rate from the sprinklers (in mm/hour) is always chosen to be less than the basic infiltration rate of the soil.

**Suitable irrigation water** A good clean supply of water, free of suspended sediments, is required to avoid problems of sprinkler nozzle blockage and spoiling the crop by coating it with sediment.

### **Sprinkler System Layout**

A typical sprinkler irrigation system consists of the following components: - Pump unit Mainline and sometimes sub mainlines Laterals Sprinklers.

### **DRIP IRRIGATION**

**Suitable crops** Drip irrigation is most suitable for row crops (vegetables, soft fruit), tree and vine crops where one or more emitters can be provided for each plant. Generally only high value crops are considered because of the high capital costs of installing a drip system.

**Suitable slopes** Drip irrigation is adaptable to any farmable slope. Normally the crop would be planted along contour lines and the water supply pipes (laterals) would be laid along the contour also. This is done to minimize changes in emitter discharge as a result of land elevation changes.

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**Suitable soils** Drip irrigation is suitable for most soils. On clay soils water must be applied slowly to avoid surface water ponding and runoff. On sandy soils higher emitter discharge rates will be needed to ensure adequate lateral wetting of the soil.

**Suitable irrigation water** one of the main problems with drip irrigation is blockage of the emitters. All emitters have very small waterways ranging from 0.2-2.0 mm in diameter and these can become blocked if the water is not clean. Thus it is essential for irrigation water to be free of sediments. If this is not so then filtration of the irrigation water will be needed.

**Drip System Layout** a typical drip irrigation system consists of the following components: Pump unit Control head Main and sub-main lines Laterals Emitters or dripper.

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<b>Self-Check -2</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write the different types of irrigation system. (5points)
2. Write the steps to construct border irrigation system.(10points)
3. What does irrigation mean (5 points)

**Note: Satisfactory rating - 10points and above**

**Unsatisfactory - below 10 points**

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

### Answer Sheet

Score = \_\_\_\_\_

Rating: \_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Short Answer Questions

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<b>Information Sheet- 3</b>	<b>carryout Interactions with other staffs and customers</b>
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### **3.1. Carrying out interactions with staff and customers**

We can all agree that customer interaction is critical in today's market, but what does that mean? Some scholars said "We fundamentally believe that our customers want three things in any of the departments; tell them the truth, do what you say you are going to do and keep them informed."

The term "customer interaction" may have several definitions. Let's define it as communication between one of staff members and the customer. We still need to improve at the basics; smile, make eye contact, slow down, be sincere, focus on your customer, tell the truth now, make promises and keep them, ask good questions then shut up and listen. Do not take these for granted. We all tend to get wrapped up in our busy days and we slip a little further away from what we know is right without intention. Watch your people execute these fundamentals daily.

"Ask the customer what they want and give it to them" has long been our premise for doing business but that is no longer enough. Interaction for its own sake falls short; it must fit our customers' desires. We must now learn our customers as individuals and anticipate their wants and needs. This includes how they wish to interact with us on a personal level, how often, in how much detail and method.

Positive interactions with staff help create an atmosphere which is calming and safe, especially it encourage treating each other with kindness and respect.

An environment where staff relationships are positive, where staffs are able to express their emotions appropriately and where staffs feel satisfaction within their job helps create an ideal environment. High quality interactions lead to meaningful experiences on both sides.

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An environment with clear boundaries that is rich in open ended materials allows to actively and independently engage in activities lends it to positive interactions.

To achieve quality interactions you need time, with minimal disruption. Creating interaction times will enable staff to have meaningful connections with the children in their care, leading to high quality experiences on both sides, of any quality service.

- Effective communication allows people of all ages to give direction, praise, show respect, display emotion, and tell a story! Talking, listening and body language are important components of communication. As an adult, our role in the conversation is to ask open-ended questions while keeping the conversation flowing.

### **3.2. Interactions with other staff and customers**

In surface and drip irrigation projects, since most water sources are common for all and traditional shared and jointly program is settled for watering schedule, communication and interaction between them is common through which all types of conflicts can be resolved.

Interaction with other external staff and service costumers in relation to the mechanical encountering problems can be kept in touch leaded by the enterprise supervisor like communication with engineers for maintenance of water pumps and irrigation structures, for tasting of different technological products or request may be forwarded in showing how the equipments and machineries work.

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<b>Self-Check -3</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write some of the problems to carryout irrigation work (5pts)
2. List some elements which help to have positive Interaction with staff and customers.(2pts)
3. How could you undertake irrigation work in a safe and environmentally appropriate manner.(3pts)

**Note: Satisfactory rating -5 and above**

**Unsatisfactory - below 5pts**

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

### Answer Sheet

Score = \_\_\_\_\_

Rating: \_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Short Answer Questions

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#### **4.1. Understanding enterprise policy and procedures**

Any enterprise has its own policy and procedures that helps to guide the work operators how to use their time, how to perform their work, how to handle their tools, materials and equipments and other activities. Therefore, the employee before starting their work, they should know or understand the enterprise policies and procedures to perform their work properly with in proposed time. Knowing the policy and procedures of the enterprise may support the employee from doing wrong things.

In this level since the learner is assumed to be operator under supervision, he should implement all orders of activities as supervisor's instruction of steps for job accomplishment. The learner may not be asked for distortion of procedures but to the maximum, his efforts should be responded to the supervisor.

#### **4.2. Reporting of problems or difficulties**

During the process of undertaking irrigation work as directed, reporting of problems or difficulties should be considered very important. Because the plan and settled direction of irrigation work is expected to indicate all required tools, equipment and materials, procedures for occupational health and safety condition of work place.

Related to the above conditions and performance of achieving the goal of the task, problems and difficulties are practically expected to be seen. These conditions should be automatically reported to the supervisor and other concerned body so as to correct and retain the work place functional, productive, save expenditure and safe working environment.



<b>Self-Check -4</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Please say something about the uses of reporting problems and difficulties in irrigation work.(5pts)

**Answer Sheet**

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Short Answer Question**

**Operation Sheet 2****Undertake nursery work as directed****Basin Construction**

The following steps are involved in the construction of basins: setting out; forming the bunds; and smoothing the land within the basins.

**Step 1: Setting Out**

Before construction can begin the location of the basins and bunds must be set out on the ground. This can be done using pegs, string lines or chalk powder to mark the lines of the bunds.

**Step 2: Forming the bunds**

Both temporary and permanent bunds can be formed by hand labor or by animal or tractor powered equipment. When soil is gathered from an area close to the bund a 'borrow-furrow' is formed. This furrow can be smoothed out later or be used as a farm channel or drain.

**Step 3: Smoothing the land**

This can be the most difficult part of basin construction and involves very careful leveling of the land within each basin.

The following steps are taken to construct furrows:

1. Setting out; forming one (or more) ridge(s); line is set out in the field along the proposed line of furrows. This can be done by setting up ranging poles or marking a line on the ground with chalk powder or small mounds of earth straight an experienced ploughman should be able to plough along the line by aligning the poles or earth mounds.
2. Forming one (or more) the ridger is moved along the line. The resulting furrow should be straight. If not, the area should be ploughed again and the procedure repeated. Parallel ridge(s). About every five (5) meters, a new straight line should be set out. If a ridger-drawbar connected with a tractor is used, four furrows can be drawn simultaneously

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<b>LAP Test</b>	<b>Practical Demonstration</b>
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Name: \_\_\_\_\_ Date: \_\_\_\_\_

Time started: \_\_\_\_\_ Time finished: \_\_\_\_\_

**Instructions:** Given necessary templates, tools and materials you are required to perform the following tasks within 8-12 hours.

**Task 1:** construct basin irrigation system.

**Task 2:** construct furrow irrigation system.



<b>Instruction Sheet</b>	<b>Learning Guide # 35 Handle &amp; clean up and store materials and equipment.</b>
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This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Storing waste and debris
- Cleaning and storing Materials, equipment and machinery
- Making and practicing a good site

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:

- Store waste and debris
- Clean and store Materials, equipment and machinery
- Make and practice a good site

**Learning Instructions:**

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described
3. Read the information written in the information “Sheet
4. Accomplish each “Self-check respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to the next or “Operation Sheet
6. Do the “LAP test”

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## 1.1.

**Storage of****waste material and debris**

Irrigation sewage should be disposed of wherever and however:

- Via privies,
- "Behind the bush,"
- Cesspits,
- Cesspools,
- Pipes or
- Troughs away from the homes, etc.

Basically waste materials and debris produced or generated during irrigation work is stored in a designated area according to enterprise guidelines with close supervision and responsibility of supervisor assigned.

Waste is defined as "refuse from places of human or animal habitation." The World Book Dictionary defines waste as "useless or worthless material; stuff to be thrown away." Unfortunately, both definitions reflect a widespread attitude that does not recognize waste as a resource. "Zero Waste America" defines waste as "a resource that is not safely recycled back into the environment or the marketplace." This definition takes into account the value of waste as a resource, as well as the threat unsafe recycling can present to the environment and public health. The word 'waste' and the act of 'wasting' are human inventions. Waste doesn't exist in nature. In nature,





everything has a purpose. Waste was created by humans for short-term convenience and short-term profit. Wasting results in long-term harmful consequences for humans, nature, and the economy. Based on this understanding of waste in irrigation work activity most wastes generated are valuable recourses for re-fertilizing of productive soils like from the wastes we can process

Humus and organic materials.



**Fig:** Picture indicates the value of organic wastes

The remnants are the common phenomenon of any work places. These items are varying from material to material, because different work operation needs different materials. These materials should be segregated according their characteristics, based on this segregation the reusable remnants should be processed to use again and non reusable remnants disposed without polluting the environment. If the materials are stored properly in a planned manner we can mitigate or reduce the dangers on the employees and on the environment. Storing materials in an open yard requires attention not to be spread around work places. The reusable output should be forwarded to recycling process.

### **1.2. Guideline for handling and transporting of materials, equipment and machinery**

The Manual Handling Operations Regulations define it as 'any transporting or supporting of a load (including the lifting, putting down, pushing, pulling, carrying or moving thereof) by hand or by bodily force'. In effect, any activity that requires an

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individual to lift, move or support a load will be classified as a manual handling task. Handling and transporting will be conducted as of the instruction and guidelines of which the enterprise follows.

Related to the shuttle or transporting of these materials, equipment and machineries workers should understand characteristic of materials that should be transported from one place to other. Because some irrigation works equipment, tools and machineries are made of iron, sharp and difficult to handle with bare hands. For these conditions we have to think more before this activity is started and make ready of personal protective equipment (PPE) and aware about occupational health and safety (OHS) regulations and rules.

## **Handling and transporting materials, equipment and machinery**

Material handling equipment (MHE) is used for the movement and storage of material within a facility or at a site. MHE can be classified into the following five major categories:

- I. **Transport Equipment.** Equipment used to move material from one location to another (e.g., between workplaces, between a loading dock and a storage area, etc.). The major subcategories of transport equipment are conveyors, cranes, and industrial trucks. Material can also be transported manually using no equipment.
- II. **Positioning Equipment.** Equipment used to handle material at a single location so that it is in the correct position for subsequent handling, machining, transport, or storage. Unlike transport equipment, positioning equipment is usually used for handling at a single workplace. Material can also be positioned manually using no equipment.
- III. **Unit Load Formation Equipment.** Equipment used to restrict materials so that they maintain their integrity when handled a single load during transport and for

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storage. If materials are self-restraining (e.g., a single part or interlocking parts), then they can be formed into a unit load with no equipment.

- IV. **Storage Equipment.** Equipment used for holding or buffering materials over a period of time. Some storage equipment may include the transport of materials. If materials are block stacked directly on the floor, then no storage equipment is required.
- V. **Identification and Control Equipment.** Equipment used to collect and communicate the information that is used to coordinate the flow of materials within a facility and between a facility and its suppliers and customers. The identification of materials and associated control can be performed manually with no specialized equipment.

Self-Check -1	Written Test
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define material handling equipments (5pts)
2. Write the five categories of material handling equipments(10pts)
3. What does waste mean.(5pts)

**Note: Satisfactory rating - 10 points**

**Unsatisfactory - below 10 points**

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

### Answer Sheet

Score = \_\_\_\_\_

Rating: \_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Short Answer Questions.

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<b>Information Sheet- 2</b>	<b>Cleaning and storing Materials, equipment and machinery</b>
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### 2.1. Disposing of or returning materials to store

Irrigation practices generate waste materials, such as catch basin sludges and street sweeping debris. Virtually all irrigation practices generate waste by-products. Typical wastes include:

- **Slurry** from road repair and resurfacing activities and right-of-way utility work.
- **Base material** and gravels from road base and shoulder repair activities.
- **Sludges, sediment, and debris** from streets, parking lots, catch basins, and storm drain lines which are picked up with mechanical sweepers, vacuum/air sweepers, vacuum equipment, or by hand.
- **Dredged sludge materials** from channel, stream and detention pond maintenance.
- **Dropped leaves** that are collected seasonally.
- **Other vegetation** such as grass clippings, woody debris and dead plants and shrubs, that are collected by crews maintaining streamside areas, roadsides, medians, parks and other vegetated public areas.
- **Deicing sands and gravels** from road and bridge snow and ice control operations.

Currently there are several options for recycling some of the waste materials described above. Leaf and other vegetative debris can be made into compost for use at public park facilities, or sold to suppliers in the local area (see Case Study later in this chapter). Sand and gravels can be collected and washed for reuse as deicing materials, or used “as-is” for trench backfill and for road base and shoulder material.

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## Dewatering practices

Dewatering is commonly used by most agencies to reduce the volume and weight of debris to be recycled or land filled. Dewatering facilities should be contained (e.g., concrete pad, berms and roof if possible) and should be plumbed to the sanitary sewer system, not to the storm sewer or nearby streams.

Irrigation sewage should be disposed of wherever and however: via privies, “behind the bush,” cesspits, cesspools, pipes or troughs away from the homes, etc. These approaches worked for a long time in the new United States -- until, in certain cases, the density of the involved cities and towns evolved to the point that the sewage disposal locations were getting too close to (and/or negatively impacting the taste, odor and quality of) the area’s drinking water supplies

Intermittent filtration, in which raw or settled sewage was applied evenly to the surface of prepared areas of sand or other fine material a few feet in depth (which was under drained by lines of tile with open joints). The goal was that during its passage through the bed, the sewage was to be purified via the removal, and changing of the organic matter into more stable substances by physical and biological processes working in conjunction with the oxygen present in the matrix of the sand. The process derived its name (basically) from the necessity to intermittently apply the sewage in order that air required for the oxidation of the organic matter could enter the voids of the sand during the dry period.

Another early method of sewage treatment was “chemical precipitation”; it involved the addition of lime, lime and sulfate of iron, or other coagulants to form an inorganic floc, which absorbed and, upon settling, carried down with it particles of suspended solids, leaving a relatively clear liquid. The sludge produced was large in volume and quite offensive in character.

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## 2.2. Cleaning, maintaining and storing tools and equipment

**Cleaning:** - is the process of removing dirt's and unwanted materials from workplace.

The equipments used in irrigation work require cleaning, maintaining and storing properly after use. Maintenance and storing of equipments has been discussed before.

Cleaning is one of the most essential elements in maintaining a safe tool and equipment. Some of the equipments commonly used for cleaning purpose are listed below.

- air freshener dispenser,
- sealer applicators, rubbish bins, waste bins, large industrial bins, tidy bins,
- brooms, handles, buckets, mop buckets, window cleaning buckets, brushes, Bannister, flue, bottle brush, brickies brushes, dairy scrub, deck scrub, grout brush, kitchen brush, lint roller, nail brush, shoe brush, spirit brush, scrubbing brush,
- Freedom spray Mop
- wire brush, toilet brush, toilet set, dust pans, duster, lambswool duster, feather duster, mops, mop heads, carpet bonnets, nippers,
- rubbish picking up tools, wall washers, wall washing, warning sign, safety signs,
- wet floor sign, tool holders

### Site maintenance

- The job site shall be kept in a neat, clean, and orderly condition at all times during the installation process.
- All scrap and excess materials are to be regularly removed from the site and not buried in trenches.
- Trenching, laying pipe and backfilling shall be continuous so that the amount of open trench at the end of each work day is minimized. Any open trench or other excavations shall be barricaded and marked with high visibility flagging tap

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<b>Self-Check -2</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. How could you dispose wastes or return to store? Explain it. (10pts)
2. Define the word cleaning.(6pts)

**Note: Satisfactory rating - 8 points**

**Unsatisfactory - below 8 points**

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

### Answer Sheet

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Short Answer Questions





<b>Information Sheet- 3</b>	<b>Making and practicing a good site</b>
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### **3.1 Making the site good**

Irrigation work sites are expected to be clean, tidy, comfortable and good to create conducive environment for work.

Cleanliness is the most essential elements in maintaining a healthy and safe work environment.

Not only does a clean workplace reflect the professionalism of a business or facility and help

Motivate employees; it also promotes a healthy workforce as a clean environment prevents accidents and the spread of germs.

Many office managers strive to maintain a clear work site policy, few succeed. However, each employee.

Like Health & Safety, maintaining a clean work environment is the responsibility of everyone. However, there is only so much cleaning the team can do during each shift and in such cost conscious times it makes sense for employees to adopt some simple good housekeeping practices and allow the cleaning team to concentrate on hygiene and deep cleaning tasks.

Preventing mess as well as clearing up as you go along helps create a healthy workplace and provides the professional cleaning teams with a good platform to make effective use of their time on-site, allowing them to concentrate on hygiene, germ containment, recycling and deep cleaning. Working together we can all contribute to creating a safe and healthy workplace and a professional looking facility for employees, visitors and customers?

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### 3.2. Instructions and environmental practices for making a site good in quality

An efficient and cohesive workplace is all about building the morale and productivity of your employees and minimizing complaints, disruptions and legal argument, so everyone can get on with their work. This adds to your bottom line and builds your reputation in the business community. Following are a range of best practice guidelines for induction, appraisal, promotion, staff development and training, positive work environment and grievance procedures to help you building and maintain a workplace free from discrimination and harassment. Best practice guidelines for the workplace environment checklist to use as a guide is included at the end of this section. All the above conditions and points indicated should be computed and environmentally balanced targeting the issue of making a site good in quality and sustaining human life and tending activities

<b>Self-Check -3</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

#### 1. How do you keep the irrigation work site good? (10pts)

**Note: Satisfactory rating – 5 points**

**Unsatisfactory - below 5 points**

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

#### Answer Sheet

Score = \_\_\_\_\_

Rating: \_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

#### Short Answer Question

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<b>Instruction Sheet</b>
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<b>Learning Guide # 36 Complete documentation</b>
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This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Reporting problems or difficulties in completing work
- Identifying and reporting malfunctions, faults and wear/damage
- Reporting Work outcomes actions

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:

- Report problems or difficulties in completing work
- Identify and reporting malfunctions, faults and wear/damage
- Report Work outcomes actions

**Learning Instructions:**

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described
3. Read the information written in the information “Sheet
4. Accomplish each “Self-check respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to the next or “Operation Sheet
6. Do the “LAP test”



<b>Information Sheet- 1</b>	<b>Reporting problems or difficulties in completing work</b>
---------------------------------	--

### **1.1. Report Problems or difficulties in completing work to required standards or timelines.**

In the work of irrigation project (either installation or maintenance) there are different problems or difficulties you may face. But, an important point in every work including any irrigation project is reporting the problems or difficulties you encountered to concerned body and finding of solutions to problems. The report may include:-

- ✓ Work place
- ✓ Work type
- ✓ Type of problems or difficulties encountered
- ✓ Time of problems or difficulties encountered
- ✓ Any hazards you face due to problems or difficulties encountered
- ✓ Any Measures taken to minimize risk, and
- ✓ Recommendations to protect work place before any hazard occur

Many hand tools for the irrigation come with wooden handles which need special care **to prevent splitting and breaking**. At least twice a season sand them with a medium grit sandpaper and then rub in linseed oil to create a protective barrier. Wood handled tools need to be stored indoors and dried before storage.

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If a handle fails or breaks, replacements can usually be found in hardware or garden stores. Generally it is simply a matter of removing the old screws and installing the new handle with fresh hardware

Putting **irrigation** tools away properly for the winter can add years to the life of your equipment. Your tools will be **protected from rust and wear**, and better yet, they'll be ready to go the moment spring fever hits on that first balmy day next year.

Tips & Warnings.

- Protect wooden handles and make tools easier to find by giving them a coat of red paint before putting them away for the winter.
- Never leave irrigation **tools** outside over the winter, as this dramatically increases their chances of springing leaks. Instead, drain the hoses at the end of the season and hang them in a garage or other protected spot until spring

<b>Self-Check -1</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write the importance of reporting problems to supervisor.(5pts)
2. what are the problem that can occur in irrigation work(15pts)

**Note: Satisfactory rating - 10 points**

**Unsatisfactory - below 10 points**

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

### Answer Sheet

Score = \_\_\_\_\_

Rating: \_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

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## Short Answer Questions

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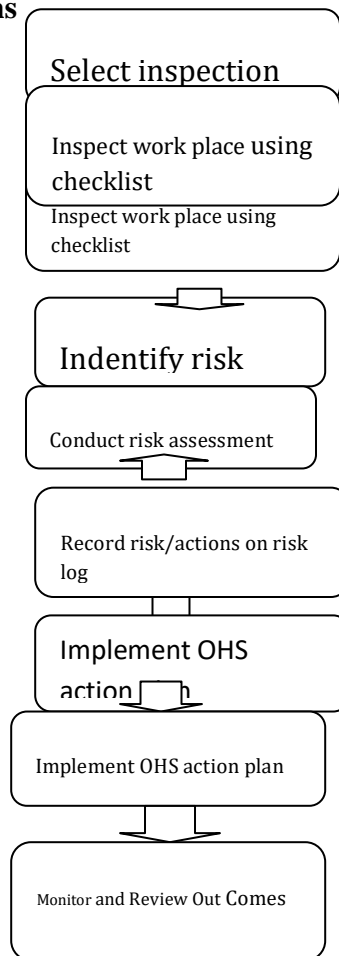
<b>Information Sheet- 6</b>	<b>Identifying and reporting malfunctions, faults and wear/damage</b>
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## 6.1. Identification and reporting of OHS hazards

The first step in managing irrigation workplace risks is to identify them. It is important to involve everyone participating in this task. Tools that can assist you to identify and address risks are a risk assessment and a structured workplace inspection using a workplace inspection checklist.

### Workplace risk inspections

#### Workplace risk inspections





## 6.2. Hazard identification

Hazard identification is a process used to identify all possible situations where people may be exposed to injury, illness or disease, the type of injury or illness that may result from these and the way in which work is organized and managed. It is the first part of a risk management strategy described in Occupational Health & Safety Management System (OHSMS).

On induction staffs are made aware that they are an active part of the organization's OHS policy. Each staff member has a responsibility to their colleagues and their organization to report and act upon any potential workplace hazard.

All staff needs to be aware of the type of hazards that are possible in their work environment.

### Procedure:

- ❖ Identify the hazard
- ❖ Clear the area close to the hazard
- ❖ Partition the hazard off or clearly identify the area to protect other people from harm
- ❖ If the hazard is easily and safely cleared, then do so

### If not...

- ❖ Report the hazard to the appropriate person, to obtain assistance

Following clearing of the hazard fill out the correct documentation to assist in identifying improved practice to reduce further incidence of hazards.

If the workplace hazard appears to be dangerous to staff and clients and professional assistance is required:

- ✓ Call the supervisor or manager and advise them of the problem and the urgency of the matter.
- ✓ Depending on the risk it may be called as an evacuation.
- ✓ Follow the evacuation procedure.

The supervisor or manager will call in the fire brigade or specialized personnel who will deal with the spill.

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Safety in the workplace is a cooperative venture, and staff and students have obligations to contribute towards and maintain safety.

The Staff are responsible for ensuring that their work environment is conducive to good occupational health and safety by:

Complying with occupational health and safety instructions, including the regulations and procedures as set out in the safety handbook. Safety regulations are in place to protect all members of the staff and other community.

- Taking action to avoid, eliminate or minimize hazards
- Reporting hazards to the relevant supervisor, manager or service unit.
- Making proper use of safety devices and personal protective equipment.
- Not willfully placing at risk the health, safety or well-being of others at the workplace.
- Seeking information or advice where necessary, particularly before carrying out new or unfamiliar work.
- Wearing appropriate clothing and protective equipment for the work being carried out, where this is required.
- Being familiar with emergency and evacuation procedures, and if appropriately trained, the location of and use of emergency equipment.
- Co-operating with directions from emergency wardens and other emergency personnel
- providing instructions and directions by supervisor

Workplace Health and Safety Regulations require employers to ensure that appropriate measures are undertaken to identify all hazards and to manage risk in the workplace.

**Hazard:** a situation at the workplace capable of causing harm (i.e. capable of causing personal injury, occupationally related disease or death).

**Risk:** the chance of a hazard actually causing injury or disease. It is measured in terms of consequences and likelihood.

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**Risk Management:-** the overall process of risk identification, risk analysis, control of risks and risk evaluation.

**Risk Control:** that part of risk management which involves the implementation of policies, standards, procedures and physical changes to eliminate or minimize adverse risks.

### 6.3. Reporting Hazards and Accidents

Employees are required to report any situation or occurrence in the workplace that may present a risk or have the potential to affect the health and safety of employees or others in the workplace.

It is required that all injuries, incidents and hazards are properly reported, investigated and recorded in accordance with the procedures detailed below

An **accident** is commonly used to describe an incident which has resulted in an injury.

An **incident** is any unplanned event resulting in or having the potential for injury, ill health, damage or loss.

A **hazard** is a source or a situation with the potential for harm in terms of human injury or ill health.

#### Injury Reporting

In the event of an injury the person involved should:

- seek first aid or medical attention as required,
- inform their supervisor as soon as possible,
- complete the Confidential Incident / Injury Report Form, and
- Assist their supervisor in the investigation and reporting on the incident or accident

The Supervisor of the person(s) involved in the incident is required to:

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- ensure that any injured person is promptly attended to,
- conduct an initial investigation into the cause of the incident;
- complete the Confidential Incident / Injury Report Form and ensure that it reaches the Safety and Health,
- Notify and liaise with the local Safety & Health Representative and line management in relation to the incident, and
- Ensure that all serious injuries are reported to the Safety and Health immediately after hours of assistance.

On identifying a hazard, staff must act as quickly as possible to eliminate it. This may mean a simple alteration, substitution or removal of the hazard or even talking to the people involved to enlighten them of their hazardous practices

<b>Self-Check -2</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define hazard (5points)
2. What is the differences between incident and accident(10points)
3. what is hazard identification(5points)

**Answer Sheet**

Score = \_\_\_\_\_

Rating: \_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

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<b>Information Sheet-3</b>	<b>Reporting Work outcomes</b>
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### 3.1. Reporting work outcomes to the supervisor

Work outcome reports must be submitted to the supervisor after completion of irrigation work.

The reports shall include;

- Specification of the quantity and each of the principal work accomplished
- The results of the environmental monitoring program,
- A summary of disposal unit survey and maintenance activities,
- A summary, by waste class, of activities and quantities of waste disposed of,
- Any instances in which observed site characteristics were significantly different from those described in the application; and
- Any other information the Commission may require

### 3.1. Report work out comes

An important point in every work including nursery work is recording data, analyzing and reporting, all the steps from the initial to the final product of the work. One of the ways of communicating to the employer or the customer is reporting work outcome .This report includes information regarding

- Raw materials
- Supplies
- Problem encountered
- Length of work
- Alternative measures
- Hazards and safety
- Techniques and system of work
- Cost expended

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- Material availability
- Sustainability of work
- Labor required
- Facilities in work

<b>Self-Check -3</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are the information includes regarding report (4 points)

**Note: Satisfactory rating – 2 points**

**Unsatisfactory - below 2 points**

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

**Answer Sheet**

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Short Answer Questions**



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