Ethiopian TVET-System

Irrigation and Drainage Design and Construction

Level III

Based on Mar, 2017G.C. Ethiopian Occupational Standard

Module Title: Monitoring and Controlling Irrigation and Drainage Operations

TTLM Code: EIS IDDC3 TTLM 06 20v1

This module includes the following Learning Guides

LG 44: Plan and Organize Work Flow

LG Code: EIS IDC3 M13 0920LO1-LG-44

LG 45: Monitor and Improve Workplace Operations and Records

LG Code: EIS IDC3 M13 0920LO2-LG-45

LG 46: Inspect Irrigation and Drainage Systems

LG Code: EIS IDC3 M13 0920LO3-LG-46

LG 47: Regulate and Control Flows and Drainage System

LG Code: EIS IDC3 M13 0920LO4-LG-47

LG 48: Solve Problem and Make Decision

LG Code: EIS IDC3 M13 0920LO5-LG-48

Instruction Sheet	Learning Guide 44: Plan and Organize Work Flow

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

- Assessing current workload of colleagues
- Preparing work schedule
- Delegating work in accordance with principles of delegation
- Assessing workflow against agreed objectives and timelines
- Assisting colleagues in prioritization of workload
- Providing input to appropriate management based on their staffing needs

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:

- Assess current workload of colleagues
- Prepare work schedule to enhance efficiency and customer service quality
- Delegate work in accordance with principles of delegation
- Assess workflow against agreed objectives and timelines and assist colleagues in prioritisation of workload
- Provide input to appropriate management based on their staffing needs

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below
3. Read the information written in the “Information Sheets 1- 5”. Try to understand what are being discussed.
4. Accomplish the “Self-checks 1,2,3,4 and,5 ” in each information sheets on pages 7, 9, 14,18 and 21.
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-checks).

6. If you earned a satisfactory evaluation proceed to “Operation sheets 1, 2, 3 and 4 on pages 2 and 23 and do the LAP Test on page 24”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity.
7. After You accomplish Operation sheets and LAP Tests, ensure you have a formative assessment and get a satisfactory result; then proceed to the next LG.

Information Sheet-1	Assessing Current Workload of Colleagues

1.1. Introduction to Workloads

Workload is the amount of work an employee is required to do in a set period of time. As a manager your task is to ensure employees are not under-utilised or, conversely, overloaded with too much work. Of course this is not necessarily an easy task in the hospitality industry because of the peaks and troughs in business, and because of the uncertainty of unexpected arrivals, such as a bus load of tourists dropping in for afternoon tea or a quick unannounced dinner before the show.

Staff who work in this industry expect high volume periods of work. They understand it is part and parcel of the nature of the business. However, it is your responsibility to make sure most of the time staff have a manageable workload where they are kept busy but are not under continual stress.

There are also sound business reasons for managing staff workload.

If a customer waits too long for service, they will simply choose to go elsewhere – either right away or next time.

There are a number of ways of determining an appropriate workload:

- This is worked out over time through practice and observation
- Ask staff for their feedback – how did they feel? Did they feel stressed, under pressure? Or did they in fact enjoy the experience of being flat out?
- Be aware of other factors impacting on staff time and contributing to their total workload – they may be expected to undertake duties for other staff members, other departments, special guests or delegated managerial duties such as banking, counting money, stock taking or delivering stock
- Prioritizing tasks into primary and secondary tasks such that the secondary tasks are ones to be done in quiet times.

Effective managers will always be aware the nature of staff roles varies over time. The job of a cashier today is likely to be somewhat different today than at the same time last year. There will be new equipment and technologies, new target markets which may mean new skills, changed legislation which means stricter control or some new internal initiatives.

Managers must realize these natural, incremental changes impact on staff workloads, and management must identify what flow on changes may need to flow from these hidden workplace modifications:

- Do staff need more time to do their job?
- Should more staff be employed?
- Should certain services be revised or eliminated?
- Will technology help?

1.2. Work Load Assessement

Workload assessment measures are used to assess the perceived demand of the task undertaken by the user. There are a number of potential reasons to assess workloads including: to distribute work equitably among staffs, to reduce error and improve effectiveness of staffs, etc.

Self-Check -1	Written Test

Direction I: Multiple choice item

Instruction: Choose the best answer for the following questions and write the letter of your answer in the spaces provided on the answer sheet. Use bold letter (2 pts each).

1. _____ is the amount of work an employee is required to do in a set period of time.
   A. Work load
   B. Prioritizing works
   C. Workload assessement
   D. Monitoring workload
2. Why we assess workloads?
   A. To distribute work equitably among staffs
   B. To reduce error
   C. To iimprove effectiveness of staffs
   D. All
3. Ways of determining appropriate workload include:
   A. Ask staff for their feedback
   B. Be aware of other factors impacting on staff time and contributing to their total workload.
   C. Prioritizing tasks into primary and secondary tasks such that the secondary tasks are ones to be done in quiet times.
   D. All of the above

Note: Satisfactory rating – 6 and above pts Unsatisfactory - below 6 pts

Answer Sheet-1

Name: _____ Date: _____

Multiple Choice Questions

Score = _____

1. _____

2. _____

3. _____

Information Sheet-2	Scheduling Work in a Manner that Enhances Efficiency and Customer Service Quality

2.1. Introduction

As a manager of irrigation and drainage system operation you are required to ensure that staff are able to meet targets and goals that have been established. This involves an understanding of and an ability to organize and manage work operations.

Some of the essential elements of being a manager involve:

- Motivating staff
- Determining workloads
- Scheduling work
- Prioritizing work
- Organizing workflow
- Delegating work.

2.2. Schedule Workloads

Scheduling work in a manner that enhances efficiency and customer service quality can be seen to involve prioritizing work, and then organizing an appropriate workflow to achieve the set targets.

Scheduling work means planning and allocating what tasks have to be done in a specific period of time, and by whom.

Scheduling work is really the end result of:

- Working out the unit's priorities – which may be based on turnover, profit, covers, rooms provided or services, timing, establishing market share or whatever else is paramount at the time.
- Working out the most appropriate workflow – this includes consideration of timing requirements, the physical availability of resources (physical and human), layout of the facility and equipment, and processes which have to be performed
- Having assessed the staffing levels and the appropriate workload for individual staff members
- Having decided on delegation of tasks – as a manager you cannot physically be in

all places at all times and so you will need to delegate certain authorities to various staff from time-to-time.

2.3. Prioritizing Work

Prioritizing in this context involves deciding on, and placing tasks in, their most effective order of importance. This order must match with the identified goals and targets of the organisation, and the objectives of individual work units, teams or departments.

The four basic steps in prioritizing work are:

- Involve staff in the process wherever possible
- Make three lists:
  - The essential tasks that absolutely, positively must be done no matter what with no excuses, no exceptions
  - Those tasks that are non-essential but that add quality to the performance of the department or unit
  - Those tasks that it would be nice to do if there is sufficient time but which are in no way important or essential
- Compare the lists you have generated with the overall goals and objectives
- Adjust the lists accordingly, allocate the work and take action to achieve the lists in priority order.

2.4. Organizing Workflow

Workflow is basically the order in which work is best done. Organizing this involves determining the logical sequence of tasks. The aim is to make sure the job is done efficiently and effectively.

Things to take into account when organizing workflow include:

- How long each individual task should take
- Recognition of staff needs and award requirements such as breaks
- The number of people to best achieve a result or task
- Occupational health and safety requirements
- The suggestions of staff who are actually doing the job.

Self-Check -2	Written Test

Direction I: Multiple choice item

Instruction: Choose the best answer for the following questions and write the letter of your answer on the answer sheet provided in the spaces provided. Use bold letter.(2 pts each)

1. _____ is planning and allocating what tasks have to be done in a specific period of time, and by whom.
   A. Scheduling work
   B. Prioritizing works
   C. Assessing workload
   D. Monitoring workload
2. The order in which work is best done is:
   A. Work flow
   B. Work order
   C. Monitoring work
   D. Assigning work
3. The last step in prioritizing work may be:
   A. Making lists of works
   B. Comparing the lists you have generated with the overall goals and objectives
   C. Involve staff in the process wherever possible
   D. Adjust the lists accordingly, allocate the work and take action to achieve the lists in priority order.
4. Scheduling work is really the end result of:
   A. Working out the unit's priorities
   B. Working out the most appropriate workflow
   C. Having decided on delegation of tasks
   D. All

Note: Satisfactory rating – 8 and above pts Unsatisfactory - below 8 pts

Answer Sheet-1

Name: _____ Date: _____

Multiple Choice Questions

Score = _____

1 _____

2 _____

3 _____

4 _____

Information Sheet-3	Delegating Work in Accordance with Principles of Delegation

3.1. Introduction

In this workplace context, delegation has two meanings:

- It can mean the allocating of tasks to staff that are part of their normal duties
- It can also mean allocating some of your own duties to staff who are willing to take these on.

3.2. Delegating Tasks to staff that are Part of their Duties

The way that you tackle the delegation of tasks to staff depends on the level of staff you are supervising. Obviously the more responsibility a staff member has, the less likely you are to delegate specific tasks to them.

But, with less experienced or more junior or lower level positions, more direction is required on the part of the manager. Some points to consider when delegating tasks in this instance are:

- Make sure you are clear about the task to be done
- communicate clearly
- Choose an appropriate time to inform the staff member about the delegation, and don't hurry the explanation
- Provide whatever instructions are necessary in the correct sequence, explaining all of the steps
- Provide training and demonstration, as required
- Continually check if the employee has any questions and encourage them to ask questions – ensure your replies underline you expect and encourage questions
- Continually check the staff member genuinely understands what is being said and shown to them
- Give them positive feedback

When delegating you may run up against problems such as:

- Age differences – where you as a younger person are trying to delegate to an older

person

- Experience differences – where you as a relative new- comer to the industry are trying to delegate to an old- hand
- Gender issues – where the opposite sex takes exception at you trying to “tell them what to do”.

3.3. Delegating Some of Your Own Duties to Staff

There are real benefits in delegating some of your own work to other staff:

- It frees you up to do other things
- It gives staff experience at managerial type tasks, providing them with additional skills and potentially more interesting work
- It promotes a team approach by sharing tasks amongst everyone – it signals you have faith in their work, efforts and decisions
- It supports the career advancement of staff – wise staff will realize you have to be able to take orders before you can give them, and they will also regard delegation as an opportunity to show their worth to others. It also provides them with the opportunity to add new skills to their resume.

There are a number of rules to follow when delegating your work to others:

- Only delegate to those staff who are interested in taking on the work – these may be staff who have confided in you they are seeking promotion, looking for advancement or willing to accept more responsibility
- Delegate interesting and varied work, not the jobs you don't like doing yourself – it is unfair just to palm off the tedious and repetitive tasks to others. If staff don't appreciate the tasks delegated to them in the first instance they will be unlikely to want extra work later on
- Make sure the work is suitable and achievable – don't force staff into doing things they are not cut out for or which they have said they are unsuitable. Where there are issues of security, confidentiality or areas which are commercially sensitive in nature, then it may be best not to delegate
- Provide the necessary encouragement, training and support – this means you don't just throw them in at the deep end and hope for the best.
- Inform other staff of the delegation before the delegated work has started – this

makes sure everyone knows what's going on, and provides a basis of legitimacy for the person to whom the work is delegated

- Review progress at agreed times – so both you and the person to whom the work has been delegated knows everything is progressing satisfactorily. It also gives the staff member a formal chance to ask questions and share experiences
- Be available for questions and queries at all times – staff who have agreed to take on additional duties must never feel they are on their own or they have been ignored. It is vital they know they can contact you at any time with any question. No matter how trivial it may seem. This on-going support, just being there if needed, is fundamental to any delegation.

3.4. Principles of Delegation

By way of providing a summary of the above, the principles of delegation relate to:

- Knowledge of team strengths and weaknesses – who is good at what?
- Knowledge of context-specific factors such as resource constraints, organisational goals, legal requirements and company policies and procedures
- Self- knowledge – about your ability to communicate and motivate staff, about how well you know the needs of the customers and the property, about how well you trust your staff
- Evaluation – to determine how effective the delegation has been, if it should occur again and to learn the lessons contained ion that delegation experience.

Self-Check -3	Written Test

Direction I: Multiple choice item

Instruction: Choose the best answer for the following questions and write the letter of your answer on the answer sheet provided in the spaces provided. Use bold letter.(2 pts each)

1. One of the following is not among principles of delegation.
   A. Knowledge of team strengths and weaknesses C. Self- knowledge
   B. Knowledge resource constraints D. Monitoring
2. One of the following ***IS NOT*** correct when delegating work to other
   A. Make sure the work is suitable and achievable
   B. Delegate to any staff based on your interest, not theirs'
   C. Provide the necessary encouragement, training and support
   D. Be available for questions and queries at all times
3. Allocating some of your own duties to staff who are willing to take these on is:
   A. Delegation C. Managing works
   B. Job Assignment D. Monitoring works
4. When do you think the problem may occur during delegation?
   A. Where you as a younger person are trying to delegate to an older person
   B. Where you as a relative new- comer to the industry are trying to delegate to an old-hand
   C. Where the opposite sex takes exception at you trying to “tell them what to do”.
   D. All

Note: Satisfactory rating – 8 and above pts Unsatisfactory - below 8 pts

Answer Sheet-1

Name: _____ Date: _____

Multiple Choice Questions

Score = _____

1 _____
2 _____
3 _____
4 _____

Information Sheet-4	Assessing Workflow against Agreed Objectives and Timelines and Assisting Colleagues in Prioritization of Workload

4.1. Introduction

Managers should assess the performance of staff against their agreed objectives and timelines. This should be done on an ongoing basis during work hours and also at scheduled times in terms of formal performance appraisals.

4.2. Assessing workflow and progress during work

The three keys are:

- Walking around the place to observe what is happening
- Mentally matching what has been achieved against what is needed
- Taking action to assist where indicators show the necessary work will not be completed on time, as required.

4.3. Staff appraisals

In many organizations staff appraisals are an ongoing Standard Operating Procedure while in others they are undertaken only where there are indicators of problems. These should not be undertaken unless there were originally some definite objectives and timelines set for staff to achieve and unless these were agreed to. The meeting should be friendly and informal. It is an exchange and sharing of information, compared to a top-down event where managers tell staff. Allow the meeting to take whatever course is necessary providing the general focus is on the staff member's performance.

You can expect the following to be covered in staff appraisal:

- Overall feeling of personal performance
- Reasons why targets were or were not attained
- Relationships with other staff which appear to be beneficial or a hindrance
- Problems with equipment and process
- Timelines for work giving rise to problems
- Problems with patrons
- Resourcing issues.

Follow these rules when leading staff meeting

- Where a problem is identified by the staff member, your role is to collaboratively identify remedial action to be taken to resolve the issue.
- Always work towards getting the staff member to agree with the plan of action decided on, so as their commitment to the solution is enhanced.
- Try not to dominate this discussion.

The meeting should be concluded by:

- Re-capping issues raised by both parties
- Setting targets and measurable objectives for the next period
- Identifying support or training required to achieve the set goals
- Setting a time and date for the next review.

4.4. Assisting staff to priorities their own work

Times will arise when there is a need for you to assist staff members in the prioritization of their workload. Critical elements in providing this sort of help are the use of feedback and coaching.

Some suggestions for assisting staffs to priorities their own work are:

- Ensure a quiet and private time to sit down with the person
- Talk with them about their position duties, the goals of the organisation and the department or unit
- Ask them to identify the most important tasks they do
- Assist them to consider how they will do these tasks, and the priority order they will allocate to each of them
- Assist them to come up with a work plan to use as the basis for the actual implementation of their plan
- Set a time to review their plans and their progress on a regular basis
- Bear in mind the aim is to get staff to priorities their own work, not do for them.

4.5. Feedback

Feedback may be seen as the on-going verbal and non-verbal support provided to staff as they seek answers to the perpetual question “How am I going?”. Verbal responses include answers to both asked and implied questions with statements such as “Looks like you've

got the hang of that pretty well", "Well done", "Looking good", "Good job".

Non-verbal responses can include a smile or grin, a nod, a silent hand clap, a physical pat on the back, the thumbs up sign or making a circle with the thumb and the forefinger.

Where negative feedback needs to be done, it should be communicated in a sensitive and empathetic fashion, usually in private. Negative feedback is best delivered using a technique called the "Positive-Negative-Positive‟ sandwich.

4.6. Coaching

Coaching is a process of providing information, including feedback, to an employee. Its purpose is to reinforce and extend knowledge and skills developed through other training.

The principles of coaching are:

Involvement: Employees should be encouraged to participate actively in coaching sessions. They should be encouraged to prioritize their own workloads, giving reasons, explanations and justifications for what decisions they arrived at.

Understanding: There must be mutual understanding of the topics being discussed, and the tasks being prioritized. Coaches must describe and explain the context of the prioritization, together with any attendant reasons and workplace imperatives.

Listening: The coach must do more listening than talking. Staff will have questions, worries, issues or suggestions and an effective coach will listen not only to what is being verbally expressed but also to the hidden sub-text beneath the spoken word.

Self-Check -4	Written Test

Direction I: Multiple choice item

Instruction: Choose the best answer for the following questions and write the letter of your answer on the answer sheet provided in the spaces provided. Use bold letter.(2 pts each)

1. The principle of coaching in which employees are encouraged to prioritize their own workloads, giving reasons, explanations and justifications for what decisions they arrived at is:
   A. Involvement C. Talking
   B. Understanding D. Listening
2. The on-going verbal and non-verbal support provided to staff as they seek answers to the perpetual question "How am I going?" is:
   A. Coaching C. Feedback
   B. Understanding D. Listening
3. How do you aassess workflow and progress during work?
   A. By walking around the place to observe what is happening
   B. By mentally matching what has been achieved against what is needed
   C. By taking action to assist where indicators show the necessary work will not be completed on time, as required. D. All
4. The staff meeting should be concluded by:
   A. Re-capping issues raised by both parties
   B. Setting targets and measurable objectives for the next period
   C. Identifying support or training required to achieve the set goals
   D. Setting a time and date for the next review. E. All

Note: Satisfactory rating – 8 and above pts Unsatisfactory - below 8 pts

Answer Sheet-1

Name: _____ Date: _____

Multiple Choice Questions

1 _____ **3.** _____
2 _____ **4.**_____

Score = _____

Rating: _____

Information Sheet-5	Providing Input to Appropriate Management Based on Their Staffing Needs

5.1. Advising management on staffing needs

Managers will, from time-to-time, be required to provide input to others in relation to various establishment needs, plans and policies. Because labour is such a large budget figure, staffing requirements is a constant area where operational managers are called on to provide information to higher level management.

An important part of your role as manager of a small team is to make sure the staff who report to you are engaged in interesting and meaningful work, they are fully occupied but not overloaded, and they have clear tasks to perform. In doing the work of a manager you will find you have more cooperation and interest from staff if you involve them and consider their suggestions for change or improvement.

As the manager of your team, you are in the best position to monitor staff needs and, where possible to meet these within the goals of your organisation. Senior management of your organisation will assume you are coping with the staff and resources you have unless you advise them differently.

Part of your role is to keep management informed of progress against goals and to advise them of any difficulties you are having with staff, patrons, equipment, suppliers, or authorities. In addition discussions may focus on any needs you are unable to meet including targets, budgets or deadlines.

At times you will find you are not always able to ensure there is a smooth and trouble-free workflow from your unit or department. There can be many reasons why you can't guarantee a smooth and trouble-free workflow from your unit:

- There is actually too much work to do
- There are problems in other areas or outside the organisation which are impacting on your unit's work
- There are unreasonable demands on your unit
- Your staff have not been provided with the necessary training to do their job effectively and efficiently

- Wrong staff have been hired or engaged in the first place
- You have equipment breakdowns.

In these instances, after you have tried to work through these issues as best you can with the staff and resources you have, it will be necessary to advise management. It is best to notify them as opposed to having them learn of the matter by themselves.

The following are tips on how to notify senior management about staffing needs:

- Choose an appropriate time to do it – strategically select a time rather than just blurt it out at random, or at some inappropriate time and location
- Decide whether to communicate what you have to say in private, or at an arranged meeting, in writing, or both
- Be very, very clear about what the problem is, and what the needs are – specify the location, the number and type of staff needed
- Spell out in detail how you have tried to addressed the issue –such as changing rosters, multi-skilling, restricting service etc.
- If possible, come up with recommendations to address the situation – this is a plan showing your recommended response to the identified situation.

Self-Check -5	Written Test

Direction I: Multiple choice item

Instruction: Choose the best answer for the following questions and write the letter of your answer on the answer sheet provided in the spaces provided. Use bold letter (2 pts each).

1. An important part of your role as manager of a small team is:
   A. To make sure the staff who report to you are engaged in interesting and meaningful work
   B. To monitor staff needs and, where possible to meet these within the goals of your organisation.
   C. To keep management informed of progress against goals and to advise them of any difficulties you are having with staff, patrons, equipment, suppliers, or authorities.
   D. All of the above are parts of your role
2. All are tips used when you notify senior management about staffing needs, ***Except:***
   A. Do it any time and place you like
   B. Decide whether to communicate what you have to say in private, or at an arranged meeting, in writing, or both
   C. Be very, very clear about what the problem is, and what the needs are
   D. Spell out in detail how you have tried to addressed the issue
3. Why you can't guarantee a smooth and trouble free workflow from your unit at your work place?
   A. Right staff have been hired or engaged in the first place
   B. There is actually no work to do
   C. There are reasonable demands on your unit
   D. Due to presence of external problems impacting on your unit's work

Note: **Satisfactory rating – 6 and above pts** **Unsatisfactory - below 6 pts**

Answer Sheet-1

Name: _____ Date: _____

Multiple Choice Questions

1 _____ **3.** _____
2 _____ **4.**_____

Score = _____
Rating: _____

Operation Sheet 1	Assessing Current Workload of Colleagues

The following are the techniques used in work load for colleagues in irrigation drainage operations.

Step 1: Prepare resources needed for scheduling

Step 2: Select two of your colleagues for whom you are going to assess current workload

Step 3: List out the lists of activities performed by your colleagues in a day

Step 4: Estimate activity durations

Step 5: Plot Activity vs duration graph from the above data

Step 6: Determine the current workload for the coleagues

Operation Sheet 2	Preparing work schedule

The following are the techniques used in scheduling work in irrigation drainage operations.

Step 1: Plan schedule management

Step 2: Define activities

Step 3: Sequence activities

Step 4: Estimate activity resources

Step 5: Estimate activity durations

Step 6: Develop schedule

Operation Sheet 3	Assisting colleagues in prioritizing their work

Consider there are five members in your irrigation and drainage maintenance team and your team is responsible for performing emergency maintenance, such as repairing leaks in lined main canal.

Steps

Step 1: Put together a full list of projects and processes your team is responsible for.

Step 2: Determine the scope and timing of work for each.

Step 3: Break down projects into smaller tasks and work streams.

Step 4: Prioritize work based on importance and urgency.

Operation Sheet 4	**Procedures for Delegating Work in Accordance with Principles of Delegation**

Steps

Step 1: Define the task

Step 2: Select the individual or team

Step 3 : Assess ability and training needs

Step 4: Explain the reasons

Step 5: State required results

Step 6: Consider resources required

Step 7: Agree deadlines

Step 8: Support and communicate

Step 9: Feedback on results

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Giving the necessary equipments and PPEs you are required to perform the following tasks ***within 3 hours.***

Task 1: Assess current workload of colleagues

Task 2: Prepare work schedule

Task 3: Assist colleagues in prioritizing their work

Task 4: Delegate task for colleagues

Instruction Sheet	Learning Guide # 45: Monitor and Improve Workplace Operations and Records

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

- Monitoring efficiency and service levels on an ongoing basis.
- Supporting overall enterprise goals and quality assurance
- Identifying quality problems and issues and make adjustments
- Changing procedures and systems to improve efficiency and effectiveness.
- Consulting colleagues about ways to improve efficiency and service levels.
- Types of workplace records
- Delegating and monitoring the completion of records prior to submission
- Maintaining workplace records.

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:

- Monitor efficiency and service levels on an ongoing basis.
- Support overall enterprise goals and quality assurance initiatives through operations in the workplace
- Identify quality problems and issues and make adjustments
- Change procedures and systems to improve efficiency and effectiveness.
- Consult colleagues about ways to improve efficiency and service levels.
- Complete and submit workplace records within required time frames
- Delegate and monitor the completion of records prior to submission and maintain workplace records.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below

3. Read the information written in the “Information Sheets 1- 7”. Try to understand what are being discussed. Accomplish the “Self-checks 1,2,3,4, 5 , 6 & 7” in each information sheets on pages 30, 34, 39, 44, 48, 51, and 54.
4. If you earned a satisfactory evaluation proceed to “Operation sheets 1 and 2 on page 55 and do the LAP Test on page 56”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity.
5. After you have accomplished the operation sheets and LAP tests, ensure you have a formative assessment and get a satisfactory result; then proceed to the next LG.

Information Sheet-1	Monitor Efficiency and Service Levels on an Ongoing Basis

1.1. Introduction

A worker have both management and operational responsibilities and are part of a work team. Managers are often responsible for staff who have multiple tasks and who move between jobs and tasks. Content-free managers are common. That is, they have not necessarily been trained in, or worked directly in, the department or area they are managing.

Most staff are directly or indirectly involved in setting goals for the organisation and working out ways to best achieve them. A manager is responsible for coordinating the work people do to achieve specific goals.

Because most organizations aim to make profits and meet customer expectations, managers are also required to make sure the work is done:

Efficiently – that is, on time and within the given resource constraints. Effectiveness measures reflect how well the actual outputs of a service achieve the agency's stated purpose (objective),describing the quantifiable extent of the outcome experienced by recipients as a result of the level and quality of the service provided.

Effectiveness is often measured through customer and/or stakeholder satisfaction /experience surveys. To be considered a proxy measure of effectiveness, the survey must seek feedback on all drivers of satisfaction. Feedback on a single driver of satisfaction such as timeliness is a measure of quality, not effectiveness.

Effectively – that is, the service or product meets quality standards and the job is done well. Efficiency measures reflect how capabilities (resources) are used to produce outputs for the purpose of achieving desired outcomes. They are expressed as a ratio of capabilities (resources) to outputs. Efficiency measures help to answer questions like:

- How much does it cost to deliver this service or product?
- Is this service or product efficient in the way it uses public money for policy purposes?

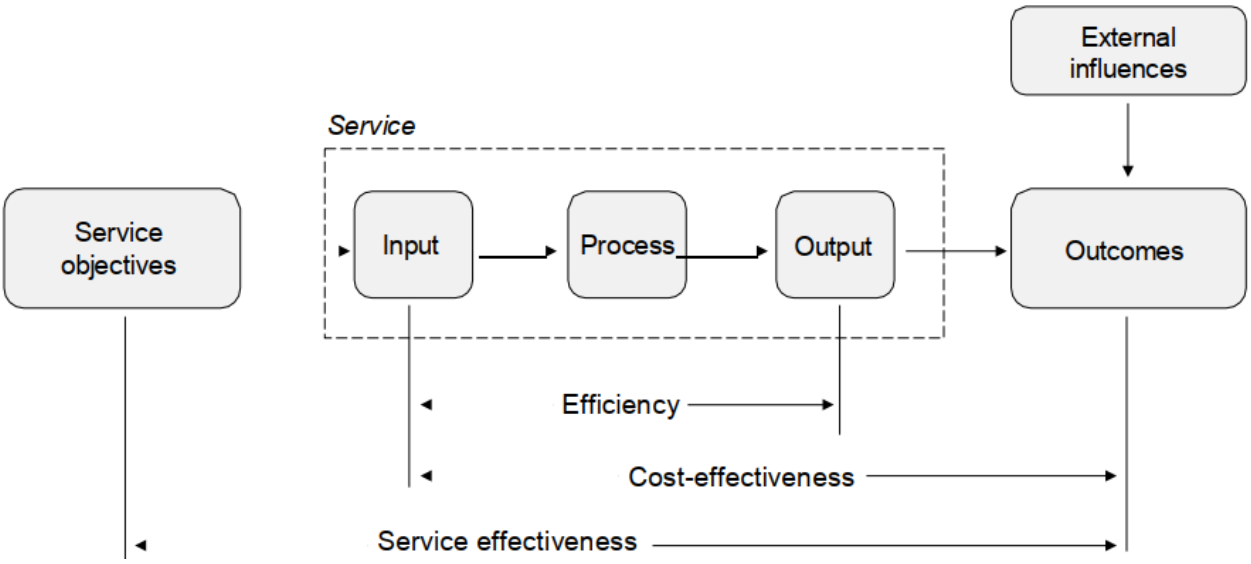


Figure 2: Measuring the efficiency and effectiveness of service delivery

1.2. Monitoring work operations

Monitoring is a process of determining how well our plans are being implemented. You cannot monitor something if you don't have a plan or basic structure of how something should be done, or a defined goal or target.

Work operations refer to the work itself and includes systems and procedures, staff performance, and levels of service in the workplace.

These operations can include:

- Service delivery – ensuring staff provide the level of service established/determined as appropriate for the establishment or department
- Customer satisfaction – generating feedback from customers about how they perceive the service being provided
- Products supplied and the nature of them – this can be the physical aspects and facilities of the rooms, drinks, food and entertainment we supply
- Dealing with paperwork

1.3. Level of Managers in the organisation(executive, middle or direct supervisor)

Their management tasks and approach will change depending on their level of responsibility within the organisation.

Chief executive officer: For example, a chief executive officer (CEO) is likely to be more

involved in:

- Dealing with the board of management
- Broad organisational planning
- Positioning the enterprise in the marketplace
- Securing large contracts for the business
- Balancing the finances of the organisation
- Leading the enterprise as a whole.
- They are more reliant on conceptual skills.

Middle level manager: The middle level manager is more concerned with:

- Operational planning
- Establishing staffing levels within given budgets
- Dealing with unresolved problems
- Setting up systems and procedures
- Supervising sales and contracts
- Encouraging staff and setting up systems to support them.

Supervisor: The supervisor – or line manager – is more likely to:

- Work directly with staff on a day-to-day basis
- Monitor their workload and workflow
- Handle queries and issues as they arise
- Verify systems are implemented and suggest changes if they are not working.
- They are required to understand the technical details of how the operation is working, and they also need to have strong interpersonal skills.

Self-Check -1	Written Test

Direction I: Matching item

Direction I: Match items under column 'A' with items listed under column 'B'. Use the space to write your answers. Use bold Letters (2 pt each)

A		B	
1.	Supervisor	**A.**	Operational planning
2.	Customer satisfaction	**B.**	Dealing with the board of management
3.	**Efficiency**	**C.**	Generating feedback from customers about how they perceive the service being provided
4.	Middle level manager	**D.**	Measures that the service or product meets quality standards and the job is done well.
5.	Effectiveness	**E.**	On time and within the given resource constraints
		F.	Ensuring staff provide the level of service established/determined as appropriate for the establishment or department
		H.	Monitor staffs' workload and workflow

Note: Satisfactory rating – 10 and above pts Unsatisfactory - below 10 pts

Answer Sheet-1

Name: _____ Date: _____

Matching Questions

1 _____ **4.**_____
2 _____ **5.** _____
3 _____

Score = _____

Rating: _____

Information Sheet-2	Ensuring that the Operations in the Workplace Support Overall Enterprise Goals and Quality Assurance Initiatives

2.1. Introduction

Management have responsibility for ensuring that operations in the establishment support the overall enterprise goals and, in some instances, quality assurance initiatives. This presupposes goals, objectives and targets do in fact exist, and they have been communicated to the appropriate staff and managers.

It is not safe to assume either or both of these exist or have been done. So, check to see what applies in your workplace.

2.2. Enterprise goals and quality initiatives

Many organizations have a way of operating called total quality management (TQM). This basically means all employees are involved in continually improving the level of service, productivity and customer satisfaction. TQM is regarded as a positive thing for organizations to be, or strive to become.

In a TQM organisation:

- There must be full, top-down management commitment, support and understanding of the TQM philosophy
- It is important to get work systems and processes right
- Involvement of the whole workforce is necessary and this is done through teams
- Customer needs are identified and met
- Problems and issues are promptly identified and adjustments are made accordingly. If an organisation has adopted a TQM philosophy, then its goals and workplace operations will reflect this approach.

2.3. Purposes of Monitoring and Taking Adjustments

There are good reasons to monitor progress and adjust plans. The benefits are:

- Things are more likely to happen as planned
- Management and staff actually know what's going on in the business

- Problems are identified and corrected
- Service and product are consistent over time
- Work operations fit with work and organisation goals
- Staff feel supported and involved
- Customer needs are met.

2.4. Monitoring in a quality environment

Monitoring in a quality environment doesn't just rely on the inspection and checking of procedures and work done. It is a total concept whereby quality is built into every aspect of work operations and there is a continual process of improvement. It doesn't blame individuals but rather concentrates on seeking better ways to do things.

Any aspect of work operations can be monitored with a view to improvement. These can include:

- The procedures or systems that exist
- The workflow
- Whether or not there are gaps or overlaps in service provision
- The workload of staff
- The time it takes to do a task or job
- Job design – that is whether jobs are challenging or interesting enough for staff
- Level of customer satisfaction with the service or product provided.

This does not mean all things are monitored at the same level all of the time .Generally some sort of automatic review will be built into most work operations, such as three or six monthly reviews and reports. Sometimes it will be necessary to concentrate more heavily on one area over another, such as an area where problems or complaints exist, or when a new system or procedure has been introduced.

Common industry problems can include:

- A high level of staff absenteeism
- Customers complaining they have to wait too long for a meal
- Takings in a certain bar are falling over the past three months
- Several guests have notified reception their bathrooms are dirty on check-in.

2.4. The monitor

In the older style management, the manager monitored and controlled the work of the staff and made changes as seen fit. To some extent this is still true today, especially in premises that are owner operated. In this scenario, the manager has the final responsibility for determining whether the goals set by the organisation are achieved.

However, increasingly, today's manager will involve staff in setting the goals and in reviewing the progress of these, and coming up with ideas and solutions to problems. This is usually done in a team setting. So, the skills and work of the manager usually involve supporting, encouraging and training staff to monitor and report on progress and seek improvement.

It can be seen the structure of the organisation has moved from a hierarchical "top down" orientation to a more devolved and lateral management approach.

Self-Check -2	Written Test

Direction I: Multiple choice item

Instruction: Choose the best answer for the following questions and write the letter of your answer on the answer sheet provided in the spaces provided. Use bold letter (2 pts each).

1. Who is responsible for monitoring irrigation and drainage operations in modern management style?
   A. The manager him/herself C. The owner
   B. The staff/operator D. The government body
2. What aspect of work operations can be monitored with a view to improvement?
   A. The procedures or systems that exist C. The workflow
   B. The workload of staff D. The time it takes to do a task or job
   E. All
3. The system in which all employees are involved in continually improving the level of service, productivity and customer satisfaction is:
   A. Total quality management C. Quality Management
   C. Workload Management D. Quality Standards
4. Benefits to monitor progress and adjust plans is:
   A. Things are more likely to happen as planned
   B. Management and staff actually know what's going on in the business
   C. Problems are identified and corrected
   D. Service and product are consistent over time E. All

Note: Satisfactory rating – 8 and above pts Unsatisfactory - below 6 pts

Answer Sheet-1

Name: _____ Date: _____

Multiple Choice Questions

1 _____
2 _____
3 _____
4 _____

Score = _____

Rating: _____

Information Sheet-3	Identifying Quality Problems and Issues and Make Adjustments

3.1. Introduction

Managers need to identify quality problems and issues quickly and take appropriate action swiftly. Failure to identify these issues and act appropriately creates an enormous potential for negative consequences for the organisation including lack of repeat business, damage to the reputation of the venue and general decline in sales and profit.

An on-going approach to monitoring workplace operations is needed to identify and address these situations. The most common quality problems in monitoring and controlling irrigation and drainage operations include:

- Difficult customer service situations
- Equipment breakdown/technical failure
- Delays and time difficulties
- Competence

3.2. Scope of authority

In most cases, no explicit approval will be required to take remedial action to address identified quality and other issues. It will be assumed responsibility for taking such action resides with the job position. The ability of staff to take unilateral action in response to an issue is called their „scope of authority‟ and it will be prescribed by management. Different positions have different scopes of responsibility.

Where an issue falls outside their scope of responsibility, approval to take action may need to be obtained from:

- The department manager
- Other more senior/experienced staff
- The owner
- The establishment manager.

The extent of approval (authorization) required will depend on the factors that apply to the issue under consideration. These may include:

- Costs involved

- Alterations required to existing Standard Operating Procedures
- Impact on other areas
- Impact on other staff
- Impact on customers
- Impact on service levels.

3.3. Common Quality Problems

Difficult customer service situations: Customer service is hard. The notion that serving customers is easy is something I've referred to as the Biggest Myth in Customer Service. There are many reasons why customer service isn't easy. These obstacles range from poor corporate strategy to ineffective leadership to our own limitations as human beings.

The most challenging customer service situations are:-

- An upset customer.
- A customer is dissatisfied.
- A customer asks you to bend the rules.
- Your product isn't up to standard.
- You don't know the answer to a customer's question.

To deal with angry customers:

- Remain calm
- Practice active listening
- Repeat back what your customers say
- Thank them for bringing the issue to your attention
- Explain the steps you'll take to solve the problem
- Set a time to follow-up with them, if needed
- Be sincere
- Highlight the case's priority

Delays and time difficulties: The following are some of the common reasons for delay of activities.

- Budget inaccuracies
- Labor challenges
- Approvals

- Subcontractor schedules and compliance
- Lack of effective communication
- Poor weather

There are ways to deal with the delay and mitigate its effects even before they happen. These are:

- Set realistic goals
- Plan the project in complete detail
- Assign clear roles
- Encourage transparency within your team
- Hire experienced workers
- Establish clear communication within the team

Finally, the following measures will increase transparency and trust and avoid customer frustrations when communicating a delay.

- Let the customer know as soon as possible.
- You don't need to explain the why.
- The customer is on your team.
- Never, ever throw your teammates under the bus.
- Be upfront about the solution(s)

Problems related to staff competence: Competence is your skill or ability in a specific field or subject, or being able to do something well or to being sane enough to stand trial in court. For example, when a pump operator has the ability to operate the pump well. Considering the benefits far outweigh the costs, improving employee competencies is an opportunity every employer should embrace.

- Coaching
- Voluntary Training
- Job Shadowing
- Challenge

3.4. When to monitor irrigation and drainage work operations

Monitoring should be occurring all the time. You can predict problems ahead of time, monitor as you go, or review after the event. All of these are legitimate and effective forms

of monitoring and most managers will use all three from time-to-time, depending on the situation. In addition, monitoring should also be done by:

Anticipating problems: This involves being able to "read ahead" and see certain systems or behaviors are probably going to result in problems or poor results. For example, by predicting an employee is going to be overloaded on a public holiday and therefore roistering on another staff member a problem has been averted and a possible problem may have been converted into a positive outcome.

Correcting problems as they happen: This involves being able to identify and solve problems as they occur, and being able to see the effects of making certain changes. This is not necessarily an easy thing to do, because of workload and time constraints.

Correcting problems after the event: Sometimes it is just not possible to anticipate a problem or to correct them as they happen. The benefit of hindsight allows us to take time to review, reflect, consult and then make changes. Also, sometimes problems are cumulative, meaning that many small instances can lead to a bigger overall problem.

3.5. Methods of Monitoring Irrigation and Drainage System Operations

The methods chosen for monitoring performance are generally built into the planning process. It is a good idea when planning to keep in mind the reporting on the success or otherwise of goals. It is frustrating to set a goal but not be able to say whether or not it has been achieved.

There are many tools or methods available to monitor progress or outcomes of work operations. Some examples are:

- Reports – statistical, financial, written or verbal
- Obtaining customer feedback
- Using a pretend customer
- Walking about the premises and observing what takes place and how it could be improved, what could be improved
- Use of checklists to tick off whether or not required service points are being adhered to by front line staff when they interact with customers
- Brainstorming sessions with staff
- Staff input and review

Self-Check -3	Written Test

Direction I: Multiple choice item

Instruction: Choose the best answer for the following questions and write the letter of your answer on the answer sheet provided. Use bold letter (2 pts each).

1. Tool or method used to monitor progress or outcomes of work operations through asking staffs to contribute any thoughts or ideas they may have about improving a particular aspect of service is:
   A. Reports C. Obtaining customer feedback
   B. Using a pretend customer D. Brainstorming sessions
2. Way of doing irrigation and drainage operation monitoring from seeing certain systems or behaviors are probably going to result in problems or poor results is:
   A. Anticipating problems C. Correcting problems as they happen
   B. Correcting problems after the event D. Coaching
3. _____is your skill or ability in a specific field or subject, or being able to do something.
   A. Quality C. Competence B. Standard D. Profession
4. Quality problem in monitoring and controlling irrigation and drainage operations related to poor time management is:
   A. Difficult customer service situations C. Equipment breakdown
   B. Delays D. Competence
5. Activities may delay due to:
   A. Budget Inaccuracies C. Labor Challenges
   B. Lack of Effective Communication D. Poor Weather E. All

Note: Satisfactory rating – 10 and above pts Unsatisfactory - below 10 pts

Answer Sheet-1

Name: _____ Date: _____

Multiple Choice Questions

1	_____	**4.**_____
2	_____	**5.** _____
3	_____	

Score = _____

Rating: _____

Information Sheet-4	Changing/Adjusting Procedures and Systems to Improve Efficiency and Effectiveness

4.1. Introduction

Adjustment of internal procedures and systems to improve efficiency and effectiveness is an on-going exercise, and involves monitoring of the internal and external environments, and the integration of findings into future planning as well as current practices.

4.2. Workplace Changes

Changes in the internal and external environments impacting on workplace operations may include:

Management changes: Changes in management may entail a variation in orientation to service, or the setting of some new directions in relation to several other factors. What was acceptable under the previous management may not be acceptable to the new management.

Organisational re-structures: The trend is to reduce or eliminate middle level management and with that comes new responsibilities for all concerned. As the organisation restructures, new roles for all staff in relation to numerous tasks (such as customer service, technical skills) will emerge.

Introduction of new equipment: New equipment means training for staff and also requires that staff can explain the new equipment/facility, be it a product or a service, to customers. The advent of the new equipment may have been necessitated by competition, brought about by down-sizing of staff or required by legislation.

Recruitment practices: There may be a need to become more professional and more targeted in the recruitment of staff. This may require premises to establish comprehensive job descriptions and job specifications before advertising for staff, and then select staff based on how well these individuals match the stated job requirements.

Economic climate: Monitoring the media and discussion with our finance institution will help identify the state of the economy. There is no doubt the state of the economy is extremely influential on trade and we have to be prepared to respond to the emerging economic climate. We can offer indulgent, extravagant, high-roller packages, whilst at

other times we need to focus on low cost, budget, value-for-money deals.

Trends in customer preferences: Whether we lead the pack or follow the opposition, we must respond to customer preferences. These changes also have implications for work operations. Nothing really exists in true and total isolation from anything else. Managers must monitor these shifts in customer trends to identify their impact throughout the organisation, and then take appropriate action to capitalize on opportunities and to minimize negative impacts.

Human capital implications: Greater efforts must be made to develop the competence of the staff. Company growth now comes as much from the employee development as from expansion with more employees and this applies as much to frontline service staff as to professional/ managerial staff.

Environmental issues: The demand for quality in the outer environment will place greater demands on how companies conduct their business, which sources of energy they use, and how they design their products: more establishments will seek to portray publicly their „green" and environmentally friendly image.

Technological development: Technological development has played a key role in the structural changes in the service sector. Boundaries between transportation, communication, travel service and hospitality industries are disappearing as internet-based services proliferate.

4.3. Developing standards and plans

The time spent actively considering your establishment's orientation to adjusting procedures and systems should result in a set of standards and plans. These must be in writing so everyone can be sure about them, understand what they mean, and know what is expected of individual staff members.

4.4. Approaches to adjusting procedures and systems

Approaches to the staff may include:

- Providing education and training service to staff, and aids and methods which help them to produce measurable improvements in quality
- Involving staff in planning and implementing quality improvement

- Building a spirit of working together towards goals
- Having instruments and channels to disseminate the company's philosophy, goals and values throughout the organisation
- Encouraging and recognizing innovation and teamwork
- Promoting a climate of open communication and feedback
- Recognizing the right of every employee to understand the requirements of his/her assignment and to be heard when offering suggestion for improvement.

Approaches to the customers may include:

- Making the customer a member of the organisation as opposed to a customer
- Rewarding faithful customers
- Communicating with customers in effective way
- Identifying customer's un-stated needs
- Ensuring customers needs and reasonable requests are met
- Providing friendly and courtesy assistance without having to be asked.

4.5. Identify and manage customer service problems

Monitoring and adjusting customer service also involves identifying customer service problems and making adjustments to standards, systems and procedures to ensure continued service quality.

The most serious problems found in service companies include:

- Difficulties in contacting service staff
- Lack of information about the services offered by the establishment
- Unclear or incomplete price information
- Unclear or incomplete deals
- Handling of complaints

4.6. Improving Delivery of Quality Customer Service

The following actions can greatly improve the delivery of quality customer service levels:

- Give benefits to key customers
- Systematize customer complaints and learn from them
- Train staff in customer care

- Give staff the authority, discretion and resources to make quick decisions
- Stimulate employees to be creative in developing customer care activities
- Invest in meetings and regular contacts with customers
- Making it easy for customer to complaint

Self-Check -4	Written Test

Direction I: Multiple choice item

Instruction: Choose the best answer for the following questions and write the letter of your answer on the answer sheet provided in the spaces provided. Use bold letter (2 pts each).

1. One of the following is ***NOT*** among changes in the internal and external environments impacting on workplace operations.
   A. Management changes C. Organisational re-structures
   B. Introduction of new equipment D. Environmental issues E. None
2. Which actions can improve the delivery of quality customer service levels?
   A. Making it easy for customer to complaint
   B. Train staff in customer care
   C. Give benefits to key customers
   D. Give staff the authority, discretion and resources to make quick decisions E. All
3. The most serious problems found in irrigation and drainage include:
   A. Difficulties in contacting service staff C. Unclear or incomplete price information
   B. Unclear or incomplete deals D. Handling of complaints E. All
4. Adjustment of internal procedures and systems to improve efficiency and effectiveness is :
   A. Conducted only in a specified time
   B. Involves monitoring of the internal environments only
   C. Involves the integration of findings into future planning as well as current practices.
   D. Involves monitoring of the external environments only

Note: Satisfactory rating – 10 and above pts Unsatisfactory - below 10 pts

Answer Sheet-1

Name: _____ Date: _____

Multiple Choice Questions

1 _____ **4.**_____
2 _____
3 _____

Score = _____

Rating: _____

Information Sheet-5	Consulting Colleagues about Ways to Improve Efficiency and Service Levels

5.1. Introduction

Effective managers will recognize the need to consult with colleagues about the best ways to improve efficiency within their unit or department, and to raise customer service levels.

Useful consultation means that staff must be actively encouraged to provide input to the development of quality customer service, and to the identification and resolution of issued that impact on its delivery.

5.2. Consultation advice

Consultation with staff should include:

- Encouraging staff to feedback all relevant comments from customers – most people won't make a formal complaint but will often make deliberate and pointed comments in front of staff. These must be reported back where they are central to improving service delivery
- Not shooting the messenger – if staff are to be encouraged to feedback negative criticism, it is very important not to criticize them simply for delivering the bad news
- Establishing agenda items – every staff meeting should have a standing agenda item for "quality feedback" or similar.
- Providing written protocols – these ensure everyone is aware of the same thing in regard to service delivery, quality standards and establishment practices. Never assume staff know exactly what is required. They may never have actually been told.
- Providing for written feedback – the establishment should have documents for staff to complete in writing if they don't feel comfortable with delivering verbal feedback.

5.3. Provide feedback to colleagues and management to inform future planning

Businesses always look for managers to make incisive and intelligent contributions about how the property should be operated and how things can be improved. This is because operators realize managers and staff are the front-line people in the organisation. Staffs have regular contact with customers and should be best placed to give feedback about ideas that may enable the property to better meet the future needs of customers.

5.3.1. Suggesting ideas

Sometimes, on the basis of the research you have done or the experience you have encountered you will feel that adjustments have to be made to various products and services to bring them more in-line with the customer demands.

Depending on the size and structure of the workplace you may make your suggestions to:

- The owner
- A board of directors
- A senior management group/committee
- Head office.

Suggestions for minor adjustments can often effectively be made verbally, but where you are proposing more substantial changes the preferred method is to make the suggestions in writing, accompanying them with any supporting evidence you might have.

Substantial changes are changes necessitating:

- Significant expenditure of money
- Significant time to implement
- Significant alteration to existing policies and procedures.

There is no end to the possibilities but the essential criteria must be their introduction will benefit the service experience for the customer, save the property money and increase revenue or profit.

5.3.2. Customer focus

All businesses should strive to be customer- focused and all significant changes to service provision need to be appropriately planned.

All establishments should aim at giving the customer what they want, and the only way an establishment can achieve this is by:

- Asking for customer feedback on present products, services and promotions
- Asking the customer for suggestions as to how the establishment could better meet their needs and expectations into the future.

By obtaining this information, the establishment can better plan for the future, using

customer-focused information as the basis for its actions rather than relying on hunches or other forms of information that are not specific to the types of customers your property attracts. All information gained from workplace experience and direct customer contact should be passed to the appropriate person for consideration in future planning.

5.4. Evaluate current and emerging industry trends and practices

Keeping up-to-date with what is happening in the industry is an essential pre requisite for managers. The dynamic nature of the industry demands managers stay in touch with new trends, new technologies, new practices or new legislation, just to name a few.

Sources of information: There are many sources of useful information. Some of these are generic in nature and others are specific to the industry. Some of these are:

- Written materials
- Internet
- Conferences and seminars
- Product launches
- Industry associations
- Colleagues, supervisors and managers
- Market research data
- Talking to the reps

Self-Check-5	Written Test

Direction I: Multiple choice item

Instruction: Choose the best answer for the following questions and write the letter of your answer on the answer sheet provided in the spaces provided. Use bold letter (2 pts each).

1. Consultation with staff should ***Not*** include:
   A. Encouraging staff to feedback all relevant comments from customers
   B. Shooting the messenger
   C. Establishing agenda items
   D. Providing for written feedback
2. _____ensure everyone is aware of the same thing in regard to service delivery, quality standards and establishment practices.
   A. Written feedback C. Establishing agenda items
   B. Comments from customers D. Written protocols
3. Substantial changes are changes necessitating:
   A. Significant expenditure of money
   B. Significant time to implement
   C. Significant alteration to existing policies and procedures.
   B. All of the above

Note: Satisfactory rating – 6 and above pts Unsatisfactory - below 6 pts

Answer Sheet-1

Name: _____ Date: _____

Multiple Choice Questions

1 _____
2 _____
3 _____

Score = _____

Rating: _____

Information Sheet-6	Completing Workplace Records accurately and Submitting within Required Time Frames

6.1. Introduction

Workplace records are document that memorializes and provides objective evidence of activities performed, events occurred, results achieved, or statements made. Records are created/ received by an organization in routine transaction of its business or in pursuance of its legal obligations. They are important part of any work environment and should be accurately maintained within the required timeframes. There can be severe legal and financial implications if records are not kept as required, are inaccurate, are incomplete and/or are not kept up-to-date.

6.2. Types of workplace records in irrigation and drainage industries

Records in the irrigation and drainage industry can include:

- Staff records
- Performance reports
- OHS inspections, risk assessments, and reports
- Security records
- Incident register
- Customer comments and feedback forms
- Receipt of goods documentation
- Accident and illness register
- Injury claims and insurance claims
- Lease agreements and renewals
- Equipment maintenance records
- Sub contracting agreements and compliance documentation.

6.3. Staff records

These are records relating to any and all aspects of staffing the premises, and may be divided into overall records and individual staff records. Overall records are those records kept that relate to staff as a whole. They are important planning tools and allow a manager to gain an overview of what is happening with staff movements and training.

Over all records: include the following.

- Staffing rosters
- Training details by operational area
- Annual leave planning chart
- Salary and overtime payments
- Injury records.

Individual staff records: they are related to individual staff and can include:

- Position description
- Letter of appointment
- Signed employment contract or offer of employment
- Performance review records
- Copies of certificates held by the employee
- Leave records – such as annual leave, sick leave and maternity or paternity leave
- Record of uniform orders
- Training schedule
- Direct salary deduction details
- Injury claims.

Notes:

- Maintain the confidentiality and ensure the privacy of the information.
- Keep records up to date
- Investigate any individual establishment requirements relating to the keeping of records and to ensure they are observed.

6.4. Regular Performance Reports

Performance information should help to inform decision-making, as well as describing whether the required level of performance has been achieved. The purpose of monitoring and recording results is to identify areas of good performance and areas where performance can be improved.

Performance records include:

- Annual Reports
- Budget Papers

Self-Check -6	Written Test

Direction I: Match items under column 'A' with items listed under column 'B'. Use the space to write your answers. Use bold Letters (2 pt each)

A	**B**
1. Workplace record	**A.** Training details by operational area
2. Annual Reports	**B.** Major workplace records in irrigation and drainage industries
3. Individual staff records	**C.** A document that memorializes and provides objective evidence of activities performed, events occurred, results achieved, or statements made
4. Equipment maintenance records	**D.** Regular Performance reports
5. Over all records	**E.** Letter of appointment

Note: Satisfactory rating – 10 and above pts Unsatisfactory - below 10 pts

Answer Sheet-1

Name: _____ Date: _____

Matching Questions

1 _____ **4.**_____
2 _____ **5.** _____
3 _____

Score = _____

Rating: _____

Information Sheet-7	Delegating and Monitoring the Completion of Records Prior to Submission and Maintaining Workplace Records

7.1. Introduction

In some cases there can be a need for you to delegate the completion of workplace records to other staff. Where this need arises, the earlier notes on delegation must be implemented, and you have an obligation to monitor the performance of others in completing these records.

7.2. The essentials

The manager of a work area is unlikely to personally attend to all of the records in their work area. But they are accountable for their accuracy. For this reason, a manager must be prepared to delegate such tasks and have a system for regularly monitoring such records.

Staff may be given required to complete records such as:

- Time sheets
- Requisitions
- Internal transfers
- Requests for maintenance
- Daily takings sheets.

Delegating authority and responsibility for completion of such records involves:

- Finding the appropriate person to do the job
- Making sure the person is capable or trained to take on the task
- Ensuring confidentiality is maintained at all times
- Training the person in the tasks required
- Monitoring the process on a regular basis.

Monitoring may include:

- Regular visual inspection and checking of records
- Signing the records to authorize them or indicate they have been checked and approved
- Comparing the records kept with actual workplace occurrence

It is a wise manager who defers delegating record keeping tasks until they themselves understand and appreciate all aspects of the job in question.

7.3. Maintain Workplace Records

Records are kept in the workplace to document what was done and why. If someone wants to sue the business for something, then the business has records that show what was done, by whom, and when. Workplace records also document when maintenance or repairs were done, to help people remember when they may be needed next. And all of these records can help when the person who did the work moves to another town and someone else has to figure out what needs doing and how it used to be done.

Reasons for maintaining irrigation and drainage operation workplace records include :

- Legal requirements
- Contractual requirements
- To control work
- To provide data for future work

Good records will help you do the following:

- Monitor the progress of your business
- Prepare your financial statements
- Identify sources of your income
- Keep track of your deductible expenses
- Keep track of your basis in property
- Prepare your tax returns
- Support items reported on your tax returns

Self-Check -7	Written Test

Direction I: Multiple choice item

Instruction: Choose the best answer for the following questions and write the letter of your answer on the answer sheet provided in the spaces provided. Use bold letter (2 pts each).

1. Why do you control in irrigation and drainage system operation?
   A. Legal requirements C. Contractual requirements
   B. To control work D. To provide data for future work E. All
2. Activities included in monitoring workplace records are:
   A. Regular visual inspection and checking of records
   B. Signing the records to authorize them or indicate they have been checked and approved
   C. Comparing the records kept with actual workplace occurrence D. All
3. Staff may be given required to complete records such as ***Except:***
   A. Time sheets C. Requisitions
   B. Internal transfers D. Requests for maintenance E. None
4. What is your obligation if you are delegated at the work place?
   A. monitoring the performance of others
   B. Managing the performance of others
   C. Controlling the performance of others
   D. Punishing others

Note: Satisfactory rating – 8 and above pts Unsatisfactory - below 8 pts

Answer Sheet-1

Name: _____ Date: _____

Multiple Choice Questions

1 _____
2 _____
3 _____

Score = _____

Rating: _____

Operation Sheet 1	Techniques of Monitoring Workplace Operations

Steps in monitoring

The following are the procedures that should be used:

Step 1: Identify all stakeholders that are to participate

Step 2: Draw terms of reference and discuss criteria to be used

Step 3: Formulate indicators

Step 4: Formulate data collection sheets

Step 5: Analyse and aggregate data

Step 6: Participate in report writing

Step 7: Give feed back to all stakeholders

Operation Sheet 2	Techniques of consulting colleagues

Steps in consulting colleagues

The following are the procedures that should be used:

Step 1: Plan for consultation

Step 2: Identify the colleague to be consulted

Step 3: Identify and be prepared the point on which you consult colleague

Step 4: Schedule appropriate time for consultation

Step 5: consult the colleague

Step 6: Document your agreement

LAP Test 1	Practical Demonstration

Name: _____ **Date:** _____

Time started: _____ **Time finished:** _____

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

Task 1: Monitor workplace operations

Task 2: Consult colleagues

Instruction Sheet	Learning Guide 46: Inspect Irrigation and Drainage Systems

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

- Scheduling and conducting routine inspections of drainage systems and monitoring fault reports
- Identifying drainage systems
- Identifying organisational and statutory requirements
- Inspecting drainage systems
- Collecting, analyzing and reporting data on drainage system performance and usage
- Controlling water sample collecting and recording processes
- Monitoring and maintaining irrigation and drainage water
- Selecting, fitting and using correctly the required personal protective equipments

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**:

- Schedule and conduct routine inspections of drainage systems and monitor fault reports according to organisational and statutory requirements.
- Collect, analyse and report data on drainage system performance and usage
- Control water sample collecting and recording processes
- Monitor and maintain water according to organisational requirements.
- Select, fit and use correctly the required personal protective equipment

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below
3. Read the information written in the "Information Sheets 1- 5". on pages 68,71,74 and 77.Try to understand what are being discussed.
4. Accomplish the "Self-checks 1,2,3,4 & 5" in each information sheets on pages 70,73,76 79.

5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to "Operation sheets 1 & 2 on pages 82 and 83. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity.
7. After you accomplish Operation sheets and LAP Tests, ensure you have a formative assessment and get a satisfactory result; Then proceed to LG 47.

Information Sheet-1	Scheduling and Conducting Routine Inspections of Drainage Systems and Monitoring Fault Reports According to Organisational and Statutory Requirements

1.1. Introduction

Drainage is the natural or artificial removal of surface and sub-surface water from an area. Stream channels can lose their carrying capacities due to debris accumulation, sedimentation, and the growth of vegetation. One proven approach to preventing this is routinely inspect and clear debris from the drainage system. A physical inspection is vital to an Operation and maintenance program of irrigation and drainage systems.

In addition, the purpose of conducting routine inspections is to:

- Identify what is in the system (inventory).
- Identify the location of the system's components.
- Determine the condition of the components (assessment).
- Prevent problems from developing.

1.2.Types of Drainage Systems

Drainage can be either natural or artificial. Many areas have some natural drainage; this means that excess water flows from the site to swamps or to lakes and rivers. Natural drainage, however, is often inadequate and artificial or man-made drainage is required. There are two types of artificial drainage: surface drainage and subsurface drainage.

Surface Drainage: It is the removal of excess water from the surface of the land. This is normally accomplished by shallow ditches, also called open drains. The shallow ditches discharge into larger and deeper collector drains. In order to facilitate the flow of excess water toward the drains, the field is given an artificial slope by means of land grading.

Land grading is forming the surface of the land to predetermined grades, so that each row or surface slopes to a field drain.

Subsurface Drainage: Subsurface drainage is the removal of water from underground. It is accomplished by deep open drains or buried pipe drains. It is further divided in to deep open drains (the type of subsurface drainage in which the excess water from underground

flows into the open drains) and pipe drains (pipe drains are buried pipes with openings through which the soil water can enter). The pipes convey the water to a collector drain.

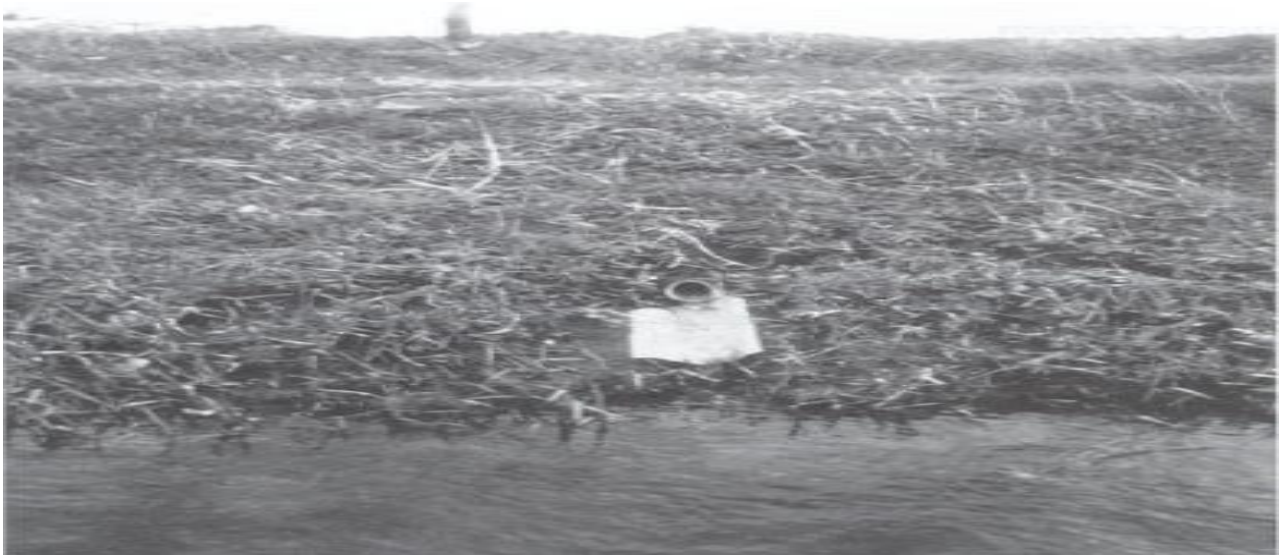


Figure 3: Pipe drain

Drain pipes are made of clay, concrete or plastic. They are usually placed in trenches by machines. In clay and concrete pipes (usually 30 cm long and 5 - 10 cm in diameter) drainage water enters the pipes through the joints. Flexible plastic drains are much longer (up to 200 m) and the water enters through perforations distributed over the entire length of the pipe.

Mole Drains: Mole drains work like pipe drains but without the pipe. They are useful in certain types of soil where pipe drainage is impractical. They are unlined cylindrical channels formed in the soil by a mole plow.

Interceptor Drains: Interceptor drains are named more for their function than their form. They are drains placed at the intersection of sloped and flat land to intercept the runoff from the slope. They may be open, pipe or mole drains.

1.3. Components of Irrigation Drainage Systems

Main drainage system: Is a water-conveyance system that receives water from the field drainage systems, surface runoff and groundwater flow, and transports it to the outlet point. It consists of some collector drains and a main drainage canal. A collector drain collects water from the field drains and carries it to the main drain for disposal. Collector drains can be either open drains or pipe drains.

The main drain is the principal drain of an area. It receives water from collector drains, diversion drains, or interceptor drains and conveys this water to an outlet for disposal outside the area. The main drain is often a canalized stream (i.e. an improved natural stream), which runs through the lowest parts of the agricultural area.

Figure 4: A main drain is often a canalized stream

Field Drainage System : It is a network that gathers the excess water from the land by means of field drains, possibly supplemented by measures to promote the flow of water to these drains. The field drainage system is the most important component for the farmers. More details on field drainage systems are given in the following section.

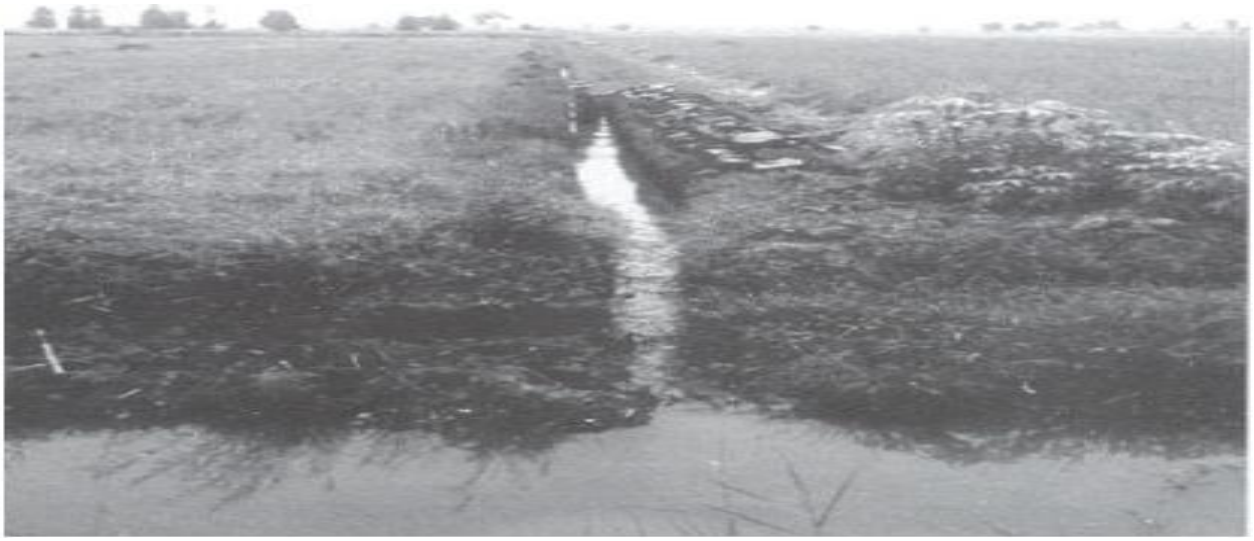


Figure 5: A field drainage system

The outlet : It is the terminal point of the entire drainage system, from where the drainage water is discharged into a river, a lake, or a sea. An outlet can be one of two kinds: a gravity outlet or a pumping station. A gravity outlet is a drainage structure in an area which has outside water levels that rise and fall. There, the drainage water can flow out when the outside water levels are low .

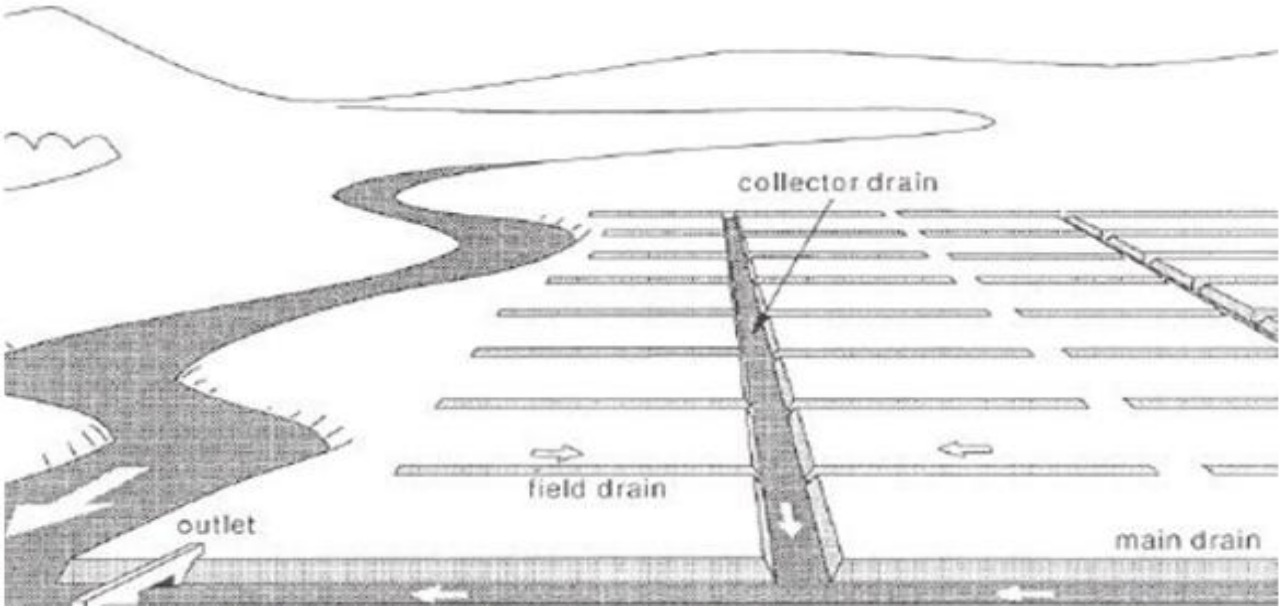


Figure 6: Components of irrigation drainage systems.

1.4. Drainage Systems to be Inspected

Routine inspection is conducted for the following components of irrigation drainage systems to monitor irrigation and drainage components. Frequent inspections and regular maintenance will help limit any damage. A canal system, and in particular the structures, can be safeguarded from problems such as leakage, erosion, siltation, rot and rust by regular inspection and immediate repair action. Since the canals are inspected regularly, structures can be inspected at the same time.

1.4.1. Pumping stations

A pumping station is needed in areas where the water levels in the drainage system are lower than the water level of the river, lake or sea. Pumping stations are either as in-line for lifting the sewage from a deeper sewer to a shallow sewer or for pumping to the out fall. Pumping stations can be:

- Horizontal pumps in dry pit,
- Vertical pumps in dry pit,
- Vertical pumps in suction well and
- Submersible pumps in suction sump.

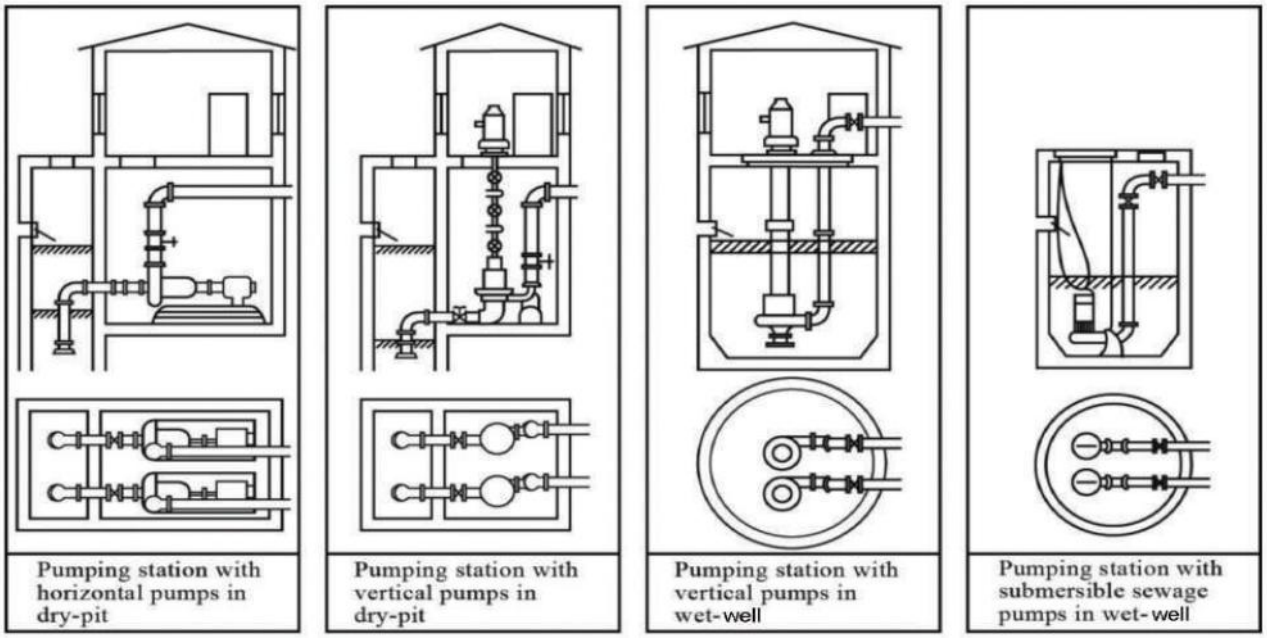


Figure 7: Typical dry well and wet well installations (Source: CPHEEO, 1993)

The inspection and maintenance of pumps schedule should list out items to be attended to at different periods, such as daily, weekly, semi-annually, annually and as needed.

Daily Observations

- Leakage through packing
- Bearing temperature
- Undue noise or vibration
- Pressure, voltage and current readings

Weekly Inspections

A typical weekly pump station inspection should include observations of the following:

- The components comprising the alarm system, i.e., the wet well controller and electrical system. Note how the pumps are sequenced.
- Bearings, packing, seals, suction and discharge gauge pressures of the pump.
- Temperature, amperage and voltage, coupling and alignment, vibration and noise of the motors.

- Check and pressure relief valves.
- Oil levels and lubrication.
- Belt wear and tightness.
- Emergency generator (exercise under load—if present).

Semi-annual Inspection

- Free movement of the gland of the stuffing box
- Cleaning and oiling of the gland bolts
- Inspection of packing and repacking, if necessary
- Alignment of the pump and the drive
- Cleaning of oil-lubricated bearings and replenishing fresh oil.
- If bearings are grease-lubricated, the condition of the grease should be checked and replaced with correct quantity, if necessary.
- An anti-friction bearing should have its housing packed with grease so that the void spaces in the bearings and the housing are 1/2 to 2/3 filled with grease.

Annual Inspection

- Cleaning and examination of all bearings for flaws developed, if any
- Examination of shaft-sleeves for wear or scour.
- Checking clearances

Annual Maintenance and Repairs

- Consumables and lubricants
- Adequate stock of items as packing glands, belts, lubricating oils, greases should be maintained.

In addition, the following basic information should be maintained for each equipment in the pumping station:

- Plant equipment identification number
- Manufacturer
- Model number and serial number
- Type of the pump
- Dates of installation and removal from service and reasons for removal
- Location when installed

- Calibration data and procedures
- Hours required to perform maintenance
- Cost of replacement parts
- O&M manuals, references and their locations

1.4.2. Discharge outlet

It is the site where drainage water is to be discharged into a river, lake, or sea influences the lay-out and functioning of the drainage system. To ensure the uninterrupted discharge of water throughout the drainage season, the outlet should not be blocked by a sand bank or vegetated flats, nor should it be at the inner curve of a river, where sedimentation occurs. At the outlet, the main drainage canal usually cuts through the natural river embankment or the dyke.

To prevent flooding of the agricultural area, the outlet is usually fitted with a sluice, which can be closed when the outside water level is high. The sluice should be near the lowest part of the area to be drained. Soil conditions in such a location, however, may cause foundation problems, and the sluice may have to be moved.

To avoid damage if there is a change of the river course or coast line, sluices are built at a certain distance from the river or sea. The entire length of the main canal reach downstream of the sluice must be protected, and some length of river embankment or coast must be protected against erosion.

To operate and maintain the gates properly, it is essential that the sluice be accessible throughout the year. The cost of constructing and maintaining an all-weather access road may influence the choice of a site for the drainage outlet.

The following are drainage outlets which are inspected and monitored regularly.

Field Outlets: Outlets into smallholder farms or individual fields can take many forms, depending on the mode of operation of the scheme and the form of construction of the tertiary canal. There are several ways of getting water out of a canal, including siphons, checks, sluice turnouts, constant discharge modules and moveable weirs. Except in the case of continuous flow schemes an effective outlet needs to be easily opened and easily closed, without leakage.

Open cuts: In its simplest form, with tertiary canals constructed of unlined earth, the outlet is merely a cut in the canal bank, which is re-sealed by the farmer after each irrigation. Where labour is cheap, this is standard practice on heavy clay and silt soils, but is not appropriate for sandy soils as it leads to rapid deterioration of the canal banks.

Spiles: Spiles are small pipes through the bank which are closed by clods of earth and do not cause repeated damage to the canal banks. They are appropriate for unlined tertiary canals. They are often used as unauthorized outlets when farmers wish to steal water from larger canals. They are applicable where all the flow is to be diverted through the outlet on a rotation schedule. They are cheap and effective, and although not completely watertight they can be made so by sealing the periphery with mud. These are no more than a formalized version of the age-old breach in the bank to temporarily divert all the flow from a watercourse into a field or farm channel.

Undershot gates: The turnouts are cheap undershot steel slide gates which are ubiquitous in many countries. However, unless fabricated from heavy (i.e. 4 mm thick) steel plate they have numerous problems in operation, not least because they always leak when closed. They are easily damaged and difficult to seal, especially when debris gets stuck in the grooves. In some countries they are an easy target for thieves who steal the steel.

Overflow slots: A less common variant of the sluice gate is the moveable overshot weir. These have some advantages over the undershot type, in that the weir can more easily be used for measuring the discharge, and leakage is less likely because water pressure on the gate seals is less. However, being a weir its discharge is more susceptible to water-level fluctuations in the parent canal than is an orifice.

Plastic siphons: This under-rated means of getting water out of a small canal is very effective because it does not leak when not in use, and it gets water directly where it is needed in the furrow.

1.4.3. Drainage inlets

Where the cross-drainage discharge is small in comparison to the canal flow, a cheap option is to use a drain inlet, which discharges drainage water direct into the canal. It is much cheaper than a super passage or culvert, and the extra cost of occasional

maintenance may be offset by the capital cost saving and its only drawback is the likelihood of sediment entering the canal.

1.4.4. Open Channel and Canal Systems

An open channel is a conveyance in which water flows with a free surface. The term is generally applied to natural and improved watercourses, gutters, ditches, and channels. A canal is an open artificial channel used to carry water by means of a man made river. It is defined as an artificial watercourse, a duct or passage that conveys fluids. That means it can also be a pipe.

Periodic inspections of channels and irrigation and drainage canals in developed areas are needed in every community to prevent the accumulation of debris deposited by storms, dumping, or natural processes.

1.5. Organisational and Statutory Requirements

The role of these regulations is to set out mandatory obligations on specific matters and provide processes or outcomes that duty holders must follow or achieve to meet their general duties under legislation.

Organizational Bylaws: Bylaws are the rules that govern the internal management of an organization. They are written by the organization's founders or directors and cover, at minimum, topics such as how directors are elected, how meetings of directors are conducted, and what officers the organization will have and their duties. In the past, organizations often had constitutions and bylaws but today bylaws are usually sufficient. The organization does not formally exist until the bylaws have been approved by the board of directors.

Bylaws and the Articles of Incorporation, are the primary official documents for a corporation, whether a business or a nonprofit. The particular requirements for bylaws are set by the state in which the organization incorporates.

Local authority by-laws: Planning and implementing of irrigation and drainage operation, which are within the legal competence of the Regional States are further transferring down to the local administrative units at Woreda levels known as water desk. These desks are responsible for planning, budgeting, implementing and monitoring and follow-up of

irrigation and drainage operation, in their respective localities.

Organizational policies: A Policy is a statement of agreed intent that clearly and unequivocally sets out an organization's views with respect to a particular matter.

- It is a set of principles or rules that provide a definite direction for an organization
- Policies assist in defining what must be done

Standard operating procedures: A standard operating procedure (SOP) is a set of step-by-step instructions compiled by an organization to help workers carry out complex routine operations. SOPs aim to achieve efficiency, quality output and uniformity of performance, while reducing miscommunication and failure to comply with industry regulations.

Environmental Protection: According to the guideline, all projects in environmentally sensitive areas are treated irrespective of the nature of the project. Before diversion and irrigation and drainage work implementation there should be environmental protection agency approval. The environmental impact of irrigation and drainage operations contributes to global warming. Construction projects emit large amounts of carbon dioxide and methane. Infrastructure developments cause pollution and produce waste. As the output of the construction industry multiplies, so can its damaging effects

Equal employment opportunity: The principle of equality is closely related to the notion of human dignity. It is grounded in the idea that all human beings, regardless of physical, mental and other differences, are of equal value and importance.

OHS procedures: OHS Policies and Procedures are a major part of protecting the safety, health and welfare of people engaged in work or employment. Having a clear set of OHS Policies and Procedures will make it clear to all concerned where the guidelines and boundaries are in relation to the operation of the business.

Employees have the following three basic rights:

- Right to refuse unsafe work.
- Right to participate in the workplace health and safety activities through the Health and Safety Committee (HSC) or as a worker health and safety representative.

Lock Out Procedures for Mechanical and Electrical Installations: If machinery could inadvertently activated, or if the unexpected release of energy could cause injury, then the energy source(s) must be isolated and controlled by using this general lockout procedure.

Dangerous goods and chemicals: Dangerous goods or hazardous goods are solids, liquids, or gases that can harm people, other living organisms, property, or the environment. Dangerous goods are substances, mixtures or articles that, because of their physical, chemical (physicochemical) or acute toxicity properties, present an immediate hazard to people, property or the environment. Hazardous chemicals are any substance, mixture or article that satisfies the criteria for a hazard class in the Globally Harmonised Systems.

World Health Organisation guidelines in irrigation and drainage: There have been a number of different water quality guidelines related to irrigated agriculture. Each has been useful but none has been entirely satisfactory because of the wide variability in field conditions. WHO Guidelines contain both microbial guideline values and good practices to reduce health risks. They offer feasible risk management solutions that will minimize health threats and allow for the beneficial use of scarce resources. The Guidelines are based on actual health risks and an evaluation of what is a tolerable risk. This will vary from country to country.

WHO Guidelines are meant to be adapted to the unique social, economic and environmental factors in each situation. According to WHO guideline, the acidity or basicity of irrigation water is expressed as pH (< 7.0 acidic; > 7.0 basic). The normal pH range for irrigation water is from 6.5 to 8.4.

Information system: An information system supports relevant and timely decision making in the irrigation subsector and helps manage subsector outcomes. As such, activities associated with collecting, processing, storing, and disseminating information are important. As a minimum, the information system for surface irrigation covers the following areas:

- Physical infrastructure—includes an asset inventory of the irrigation network, drainage network, roads, and other related facilities.
- Irrigation system management—covers crop water requirements, irrigation water supply and demand, water distribution schedule, and actual water delivery.

- Financial systems—include accounting and budgeting, water fees, billing, and collection.
- Human resource development—includes employee records; skills inventory; job description database; and staffing per department, function, activity, and expertise.

1.6. Monitoring Fault Reports

Safety issues (that is, incidents, injuries and illnesses) and faults should be reported to those who need to know about them, such as CEOs, management, supervisors, agents and Work Safe (if required). This way, problems can be identified and recorded, and action taken to prevent their recurrence.

Self-Check -1	Written Test

Direction I: Multiple choice item

Instruction: Choose the best answer for the following questions and write the letter of your answer on the answer sheet provided in the spaces provided. Use bold letter (2 pts each).

1. Iinformation system used in surface irrigation dealing with crop water requirements, irrigation water supply and demand, water distribution schedule, and actual water delivery is:
   A. Physical infrastructure C. Irrigation system management
   B. Financial systems D. Human resource development
2. The removal of water from underground is:
   A. Surface drainage C. Sub surface drainage
   B. Mole drains D. Pipe drains
3. Weekly inspections of pumping station include all, but not:
   A. Check and pressure relief valves C. Temperature and voltage of the motor
   B. Examination of shaft-sleeves for wear or scour. D. Belt wear and tightness.
4. _____is an open artificial channel used to carry water by means of a man made river.
   A. Open Channel C. Open Canal
   B. Gutters D. Ditches

Direction II: Short answer item

Instruction: Give short and precise answer for the following questions and write the your answer in the spaces provided on the answer sheet.

1. Discuss the following terms (2 pts each).
   I. Organizational policies
   II. OHS procedures
   III. Equal employment opportunity
   IV. Standard operating procedures
   V. Dangerous goods and chemicals
2. List the types of pumping stations(4 pts)

3. Replace the letters on the following figure of a given drainage system with their appropriate name(2 pt each)

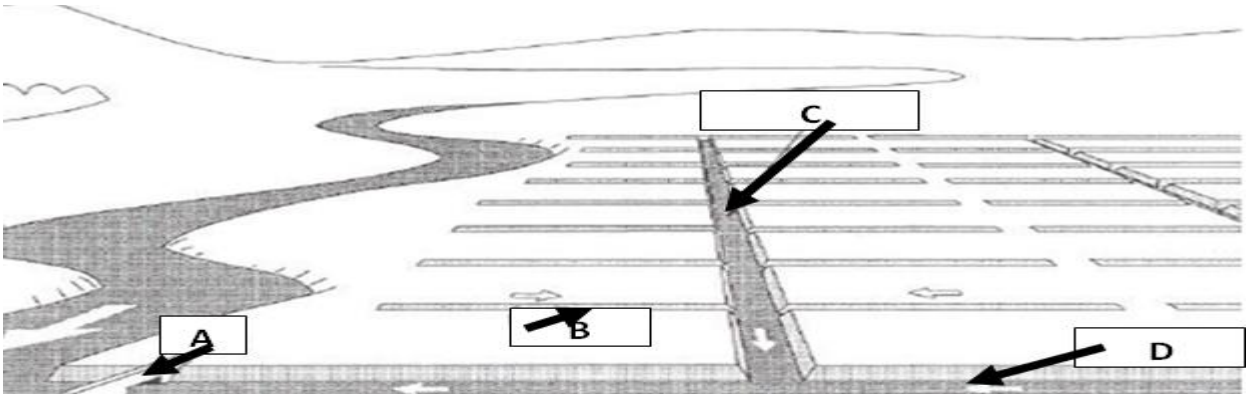


Figure 8: 'X' Irrigation System

Note: Satisfactory rating – 22 and above pts Unsatisfactory - below 22 pts

Name: _____ Date: _____

Score = _____

Rating: _____

Answer Sheet-1

Multiple Choice Questions

1 _____ **3.** _____
2 _____ **4.** _____

Answer Sheet-2

Short Answer Questions

1.

I. _____
II. _____
III. _____
IV. _____
_____
V. _____

2.

1 _____ **3.** _____
2 _____ **4.** _____

3.

A _____ **C.** _____
B _____ **D.** _____

Information Sheet-2	Collecting, Analysing and Reporting Data on Drainage System Performance and Usage

2.1. Overview of Drainage systems Performance

The main purpose of irrigation drainage systems is to collect drained water and convey it to receiving water bodies ensuring minimal damages. The performance of drainage systems is evaluated using indices of reliability, resiliency, vulnerability and sustainability.

Reliability: Reliability of a system is typically considered to be its probability of successful operation. To measure reliability, the chosen level of service measure and corresponding acceptable limit must be specified . The system reliability is reflected by how often the system fails.

Resiliency: Resiliency is defined as the degree to which the system minimizes level of service failure magnitude and duration over its design life when subject to exceptional conditions. It describes how quickly a system is likely to recover or bounce back from failure once failure has occurred. Essentially, it is a measure of how the system performs when subject to unexpected threats that exceed design conditions and the system is unable to meet the required level of service . If failures are prolonged events and system recovery is slow, this may have serious implications for system design one would like to design systems which can recover and return to a satisfactory state rapidly.

Vulnerability: Vulnerability refers to the likely magnitude of a failure, if one occurs. Vulnerability represents the severity of the failure and can be expressed as the maximum difference between allowed and calculated value of a certain variable. The whole system's total performance which is known as sustainability index of the system.

2.2. Collection of Data on Drainage System Performance and Usage

Strict guidelines must be observed in collecting data since erroneous data will lead to undetected misinterpretation. The frequency of measurement must also be adapted to the variability of the parameters with time, e.g. water table depth, hydraulic heads and discharge. The recording frequency of data must be the highest during and after storm events and irrigation supplies. In order to get information about soil heterogeneity it is recommended to install an additional number of piezometer alongside at least one drain.

The data collected should be related to:

- Water distribution at branch canal and field levels
- Adequacy of supply of rotational distribution system
- Reliability of supply to changing water demand
- Physical degradation of irrigation system
- Possible adverse effect related to drainage water quality and quantity
- Position of water tables due to over irrigation and limited drainage capacity
- Level of over all water use efficiency gains
- Level of salt accumulation in drain
- Levels of pathogens in both the canal and drain
- Industrial toxins
- Solid waste disposal problem within rural communities
- Conflicts between head and tail-end farmers
- Blockage of canals and drains due to solid uncontrolled waste disposal
- Increase of water-borne diseases due to poor sanitation and waste management

Concurrent with the operational changes and bottlenecks there has been progressive degradation in the physical state of irrigation system, for the following reasons:

- ✓ lack of funds for maintenance and renewal;
- ✓ ad hoc interventions by farmers, whether for operational reasons.
- ✓ degradation of canal banks caused by over-excavation during cleaning, animals, etc., in some places, this restricts access along canal banks;
- ✓ poor quality of some recent construction, e.g. pitching, bridges; and
- ✓ disposal of sewage and solid waste into the canals

2.3. Data analysis

Data analysis is interoperating the collected data by using different models and software. So, it is the process in which the collected drainage data are collected to meaningful and structurized data.

Self-Check -2	Written Test

Direction I: Multiple choice item

Instruction: Give short and precise answer for the following questions and write your answer on the answer sheet provided .

1. Define and elaborate the following terms(2 points each).
   I. Reliability
   II. Resiliency
   III. Vulnerability
   IV. Data analysis
2. List reasons causing progressive degradation in the physical state of irrigation system(4 points).
3. List the major data to be collected in assessing drainage network performance(6 point).

Note: Satisfactory rating – 18 and above pts ***Unsatisfactory - below 28 pts***

Name: _____ Date: _____

Score = _____

Rating: _____

Answer Sheet-1

Short Answer Questions

1 _____ **3.** _____

2 _____ **4.** _____

Information Sheet-3	Controlling Water Sample Collecting and Recording Processes

3.1. Introduction

The main purpose of collecting water sample either from the surface water or the ground water is to obtain a representative water sample and transfer it with minimal change to the laboratory for analysis. It provides a general overview of the surface and ground water sampling event. The samples are collected according to WHO guidelines and the water sample collection processes should be controlled and monitored by these guidelines.

3.2. Control Water Sampling Processes

Proper sampling and handling techniques and transportation are required to accurately determine the water quality. Contact your laboratory several days prior to sampling. The laboratory you are sending samples for testing usually provides presterilized containers and other sampling supplies, instructions and record keeping forms. Proper collection and reliable record keeping are essential. Make sure to label the sample containers.

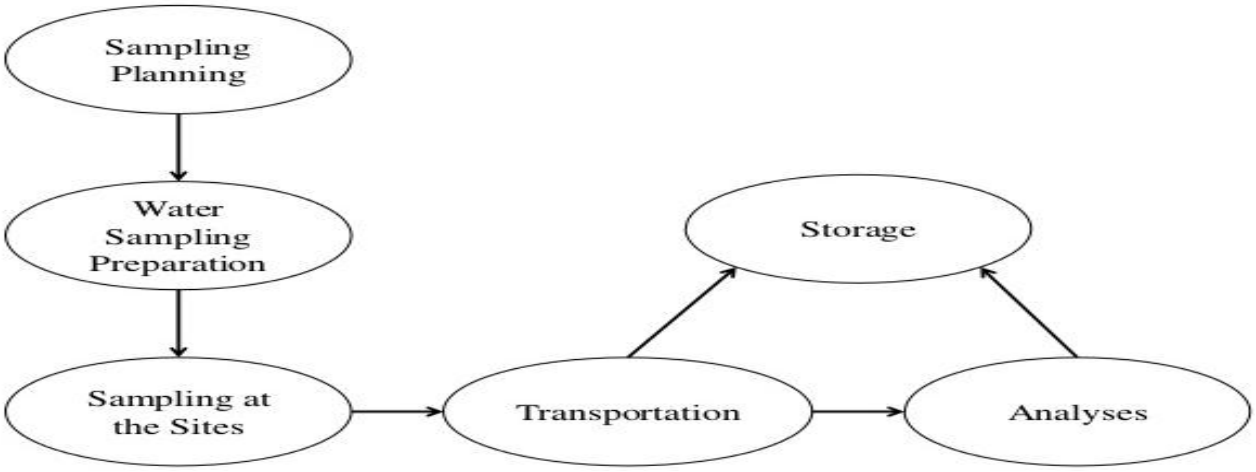


Figure 9: Sampling flow chart

Tracking and properly identifying sampling locations are as important as water collection.

Maintaining Sample Integrity: All samples should be collected with enough time for analysis within the holding time of desired analysis. Guidelines need to be followed in order to minimize sample contamination and degradation. In order to maintain sample

integrity, the sample should be available with adequate volume, correct handling procedure, free contaminations and good labeling.

Best practices for water sampling in irrigation and drainage include:

- Contact the lab performing the analysis to determine if a special specimen cup or bottle provided by the lab is required.
- Use only sterile sampling containers.
- Label the vessel with important information
- Use sterile single use gloves to collect the sample.
- Make sure your hands are never immersed in the water during sampling
- Make sure you have prepared a clean insulated cooler that will keep the sample below 10° C (50° F) during storage and transport.

3.3. Recording Sample Collection Processes

Sample Labeling: Correct labeling of samples is essential. They need to be easily identified at all times. Without proper labeling, all samples can look alike and mistakes can happen.

Samples' information should be written on a waterproof label, which should be securely affixed on the sample container. The same information must also be recorded on the water sample recording sheet. Keep records of all collected samples and a key for sample identification. Complete a chain-of-custody record form, which will help to keep track of the sample and any mishandling of the sample.

You should check and record all relevant information that can be labelled in sampling bottles such as:

- Site Name and Location
- Sample Code
- Sample Type
- Sample Point
- Sample Volume
- Time Sample was Taken
- Data Collectors' detail
- A unique identification code

- Date of sampling
- Time of sampling
- Any observations that might affect test results.

You must always keep a record of your activity when sampling water. This is done using field sheets. Field sheets are forms used to record data relating to each sample.

3.4. Sampling Locations

Samples must be taken from locations that are representative of the water source, treatment plant, storage facilities, distribution network, points at which water is delivered to the consumer, and points of use.

Sampling locations may include the followings;

- Surface water
- Irrigation systems such as canal– used in agriculture
- Bore lines – used to deliver bore water

Figure 10: Water sample collection from a pond

Self-Check -3	Written Test

Direction I: Multiple choice item

Instruction: Choose the best answer for the following questions and write the letter of your answer on the answer sheet provided in the spaces provided. Use bold letter (2 pts each).

1. Which of the following locations are used to take water samples?

   A. Ponds C. Irrigation systems B. Bore lines D. All

2. Information labelled on labeling bottles ***does not*** necessarily include:

   A. Date of sampling C. Time of sampling

   B. Sample Code D. Sample Point E. None

3. Sample integrity is maintained if:

   A. The sample should be available with adequate volume,

   B. Correct handling procedure is used,

   C. The sample is free contaminations

   D. good labeling is made E. All

4. Select incorrect statement concerning best practices for water sampling in irrigation and drainage water:

   A. Make sure you have prepared a clean insulated cooler that will keep the sample below 10° C (50° F) during storage and transport.

   B. Make sure your hands are fully immersed in the water during sampling

   C. Contact the lab performing the analysis to determine if a special specimen cup or bottle provided by the lab is required.

   D. Make sure you have used the correct sampling location in irrigation and drainage system

Note: Satisfactory rating – 8 and above pts ***Unsatisfactory - below 8 pts***

Name: _____ Date: _____

Answer Sheet-1

Multiple Choice Questions

1 _____ **3.** _____

2 _____ **4.** _____

Score = _____

Rating: _____

Information Sheet-4	Monitoring and Maintaining Irrigation and Drainage Water According to Organisational Requirements

4.1. Introduction

Water quality assessments for irrigation supply should include details on salinity, sodicity, ionic balances, boron and trace elements. Additional water quality details related to environmental and health conditions should also be carried out. The results from the assessement are used to maintain the quality of irrigation and drainage water.

4.2. Irrigation Water Quality

When determining water availability for irrigation, information is required on its quality. Water quality must be evaluated on its suitability for the intended use. Often water (and effluent) use is based on the desires of the decision maker and not the crop. Specific uses can have different water quality needs. The irrigator must know the quality of water used for irrigation. If contaminants are present, the type and concentration must be determined.

Irrigation water used for agriculture can contain undesirable contaminants, such as dissolved salts (salinity and sodicity), suspended sediment, gypsum, naturally occurring toxic elements, nematodes, and water borne diseases. Tail water (runoff) from surface irrigation systems can be reused as a water supply, but can also contain contaminants, such as sediment, agricultural fertilizers, pesticides, and organic material.

Discharge from subsurface drainage systems, treated municipal sewage, industrial wastes, agricultural food processing, and wastes from confined livestock and fish feeding operations can also be used to supplement existing supplies. Caution must be exercised when applying treated municipal sewage and industrial wastes to cropland. Depending on treatment level, these sources can contain pathogens, viruses, coli forms, salts, toxic metals, or acids.

Water suitability for irrigation is determined by the potential to cause soil, plant, or management problems. Suitability must be evaluated at the farm level for specific use and potential hazard to crops and personal health. Available farm management and the farm situation must be considered. Removing larger sized floating debris by irrigation organization facilities (trash racks, rotating screens) may be desirable

4.3. Drainage Water Quality

Table 4.3 provides a summary of changes in water quality expected in irrigation return flow relative to irrigation water applied . The expected differences in quality in the return flow are described relative to the supply water because actual concentrations in supply waters vary. The operational spill waters (bypass water) from distribution conveyances are not expected to differ much from the quality of the supply water except for some pickup or deposition of sediments.

In contrast, surface runoff or irrigation tail water tends to pick up considerable amounts of sediments and associated nutrients, phosphorus in particular, as well as water applied agricultural chemicals such as pesticides and nitrogen fertilizers (especially anhydrous ammonia).

Tail water is typically similar to the applied waters in salinity and oxygen demanding organics, termed biochemical oxygen demand (BOD). Subsurface drainage is enriched in soluble components such as dissolved mineral salts and nitrates, very low in sediments, whereas other quality parameters are similar to the irrigation water. These changes in water quality of irrigation return flow depend on a number of factors including irrigation application methods, soil properties and conditions, application of agricultural chemicals, hydrogeology, drainage system, climate, and farmers' water management.

Table 1: Expected quality characteristics of irrigation return flow as related to applied irrigation waters

Quality Parameters	Operational Spills	Irrigation Tail water	Subsurface Drainage
General Quality	0	+	++
Salinity	0	0, +	++
Nitrogen	0	0, +, ++	++, +
Oxygen Demanding organics	0	+, 0	0,-,--
Sediments	+, -	++	--
Pesticide Residues	0	++	0,-, +
Phosphorous	0, +	++	0,-, +

Note:

0 not expected to be much different than the supply water.

+,- slight increase/pickup or decrease/deposition expected.

++ expected to be significantly higher due to concentrating effects, application of agricultural chemicals, erosional losses, pickup of natural geochemical sources, etc.

- expected to be significantly lower due to filtration, fixation, microbiological degradation, etc. Source: Tanji *et al.,* 1977.

4.3.1. Factors Affecting Drainage Water Quality

Geology and hydrology: The geology of the region plays an important role in drainage water quality. Through weathering processes, the types of rocks (both primary and sedimentary) in the upper and lower strata define the types and quantities of soluble constituents found in the irrigated area.

Soils: serve not only as a medium for plant growth but also store water and nutrients and serve as the porous transport media. The soil's eroding capacity and chemical weathering leads to the generation of water borne suspended particles and solutes, ranging from nutrients to all kinds of contaminants.

Climate: As the major transport of solutes through the soil is by the movement of water, climate plays a major role in determining drainage water quality. In humid tropics and temperate regions, the dominant movement of water through the soil is vertically downwards. Solutes, which are brought onto the soil by farmers or are naturally present in the upper soil layers, are leached into deeper soil layers and groundwater.

Cropping patterns: Cropping patterns play an important role in the quality of drainage water in a number of respects. First, crops extract water from the root zone resulting in an evapo concentration of salts and other solutes in the soil solution. Where the solubility product of minerals is exceeded through evapo concentration, minerals precipitate out. This changes the composition of the soil solution and thus influences the chemical quality of subsurface drainage waters. Second, crop residues add organic matter to the soil profile. Organic matter in the soil increases the adsorptive capacity for metals and other

solutes. Furthermore, organic matter enhances the soil structure, which increases the water holding capacity of the soil.

Use of agricultural inputs: Application of fertilizers, pesticides, soil and water amendments, and animal manures may influence the quality of drainage water to a great extent. The amounts and timing of application in relation to the growing stage of the crops, timing of irrigation, drainage practices and applied soil conservation measures largely define the influence of fertilizer, amendment and pesticide application on drainage water quality.

4.4. Monitoring Irrigation and Drainage Water Qualities

Water quality within irrigated areas can be greatly influenced by the practices and activities of the farmers and the overall system operators. Good irrigation water management should be practiced at scheme level as well as field level to control water quality. These management include:

- Agronomic considerations and the cultural practices used with agricultural chemical applications require attention to resultant water quality.
- Salinity management issues should address proper leaching requirements and within scheme reuse of drainage water.
- Water table management systems should also receive more consideration for water control and water quality control where applicable.

There are four basic criteria for evaluating water quality for irrigation purposes:

- Total content of soluble salts (salinity hazard)
- Relative proportion of sodium (Na^{+}) to calcium (Ca_2^{+}) and magnesium (Mg_2^{+}) ions – sodium adsorption ratio (sodium hazard)
- Residual sodium carbonates (RSC) – bicarbonate (HCO_3) and carbonate (CO_3) anions concentration, as it relates to Ca 2+ plus Mg2+ ions.
- Excessive concentrations of elements that cause an ionic imbalance in plants

4.5. Maintaining Irrigation and Drainage Water Qualities

Salinity, sodicity and ion toxicity are major problems in irrigation waters. Sodicity, the presence of excess sodium, will result in a deterioration of the soil structure, thereby

reducing water penetration into and through the soil. Toxicity refers to the critical concentration of some salts such as chloride, boron, sodium and some trace elements, above which plant growth is adversely affected by those salts. Thus, periodic testing of soils and waters is required to monitor any change in salt content.

Some of the critical irrigation water quality measures include:

- protecting the catchment areas from erosion and deforestation above storage reservoirs and scheme supply streams,
- controlling pollution from urban and village areas that discharge wastewater to the streams supplying water to irrigated areas,
- controlling discharges from upstream users that may degrade water supplies such as industry and large animal feeding areas, and
- control of discharge from upstream irrigation schemes to minimize water quality degradation.

Water Table Control: Plants grow best when the water table is kept at or below the bottom of the crop root zone. For control of excess water in the root zone, subsurface drains are generally designed to keep the water table midway between adjacent drains from getting closer to the surface than 1 m. The depth and spacing of the subsurface drains determines the midpoint water table depth at the design discharge rate.

Leaching and Salinity Control: If drains are installed at a 2-m depth or deeper in an arid area and if adequate amounts of irrigation water are applied in the course of normal cultivation of a crop, salinity will be controlled and adequate leaching will occur to prevent soil Salinization. Drains do not need to be made larger for reclamation of saline soils because all movement of water is downward in the soil profile.

Managing drainage water at the field, irrigation scheme and river basin levels entails a number of activities including:

- regulating water table levels in the drainage system
- developing irrigation and drainage water management strategies
- setting distribution priorities and criteria for reuse in water scarce areas
- establishing cost sharing imposed on stakeholders for the use of poor quality water and required treatment to meet the water quality standards for drain discharge.

Self-Check -4	Written Test

Direction I: Matching item

Direction I: Match items under column 'A' with items listed under column 'B'. Use the space before each questions to write your answers.(2 pt each)

A	B
1. Controlling drainage water	**A.** Controlling of discharge from upstream irrigation schemes to minimize water quality degradation.
2. Use of agricultural inputs	**B.** Runoff from surface irrigation systems
3. Total content of soluble salts	**C.** Factors affecting drainage water quality
4. Tail water	**D.** Criteria for evaluating water quality for irrigation purposes
5. Measures of maintaining irrigation water quality	**E.** Maintaining physical drainage structures
	F. Regulating water table levels in the drainage system to ensure the maintenance of favorable soil moisture conditions

Note: Satisfactory rating – 10 and above pts ***Unsatisfactory - below 10 pts***

Name: _____ Date: _____

Score = _____

Rating: _____

Answer Sheet-1

Matching Questions

1 _____ **4.** _____
2 _____ **5.** _____
3 _____

Information Sheet-5	Selecting, Fitting and Using Correctly the Required Personal Protective Equipments

5.1. Introduction

All PPE clothing and equipment should be of safe design and construction, and should be maintained in a clean and reliable fashion. Employers should take the fit and comfort of PPE into consideration when selecting appropriate items for their workplace. PPE that fits well and is comfortable to wear will encourage employee use of PPE.

5.2. Selecting personal protective equipments

This is used to ensure the greatest possible protection for employees in the workplace, the cooperative efforts of both employers and employees will help in establishing and maintaining a safe and healthful work environment.

Most protective devices are available in multiple sizes and care should be taken to select the proper size for each employee. If several different types of PPE are worn together, make sure they are compatible. If PPE does not fit properly, it can make the difference between being safely covered or dangerously exposed. When conducting equipment safety checks, ensure that there are no cracks or deformities on the lenses, ensure the strap is in good working order and is firmly sealed to the cheek and forehead.

Employers are responsible for:

- Performing a “hazard assessment” of the workplace to identify and control physical and health hazards.
- Identifying and providing appropriate PPE for employees.
- Training employees in the use and care of the PPE.
- Maintaining PPE, including replacing worn or damaged PPE.
- Periodically reviewing, updating and evaluating the effectiveness of the PPE program.

Employees should:

- Properly wear PPE,
- Attend training sessions on PPE,
- Care for, clean and maintain PPE, and n Inform a supervisor of the need to repair or replace PPE

5.3. Common Use of PPE in Irrigation and Drainage Industry

A safety helmet must be worn where:

- there is a possibility that a person may be struck on the head by a falling object
- a person may strike his/her head against a fixed object

It should be noted that 'bump caps', commonly worn to protect against minimum sideways impact, do not provide protection against any of these hazards.

A wide range of accessories can be fitted to helmets to make them more suitable for variable working conditions. Examples are as follows:

- a retaining strap worn either under the chin or at the nape of the neck
- a bracket and cable clip for the attachment of a lamp
- an eye shield, face shield or welding shield
- a wide brim for additional shade in hot climates
- neck flaps for protection against weather, molten metal splash, hot substances, etc.
- a lining for cold conditions
- ear muffs Care should be taken to ensure that accessories and their attachment systems do not reduce the safety characteristics of the helmet, nor adversely affect the balance or comfort of the helmet.

Eye Protection must be worn where:

A risk of eye injury exists such as flying particles, dust, splashing substances, harmful gases, vapours, aerosols, and high intensity radiation from welding operations, lasers and strong heat sources. Consideration must be given to the need for protecting persons who are working nearby or passing close to hazardous areas. It is essential that the maximum degree of eye protection is provided.

The following should be considered when selecting appropriate eye protection:

- Nature of risk to the eyes e.g. radiation, impact, dust/abrasive particles, liquid/ chemical splash or spray etc.
- Conditions under which the person is working
- Visual requirements of the task
- Personal preference/comfort of wearer. This may include appearance, weight, ventilation and unrestricted vision.
- Condition of person's eyesight.

The need for eye protection to have appropriate impact rating and be fit for task The following general eye protectors are available:

Goggles - An eye protector fitting the contour of the face and held in position by an adjustable headband.

Wide Vision Goggles - An eye protector in which the lens or lenses extend over the full width of the face affording a large field of vision.

Welding Hand shield - A rigid eye protector which is held in the hand to shield the eyes, face, forehead and front of the neck.

Face shield - A device which includes a transparent visor, supported in front of the face to shield the eyes.

Respiratory protection must be worn where

A person is working in an environment where there is :

- deficiency of oxygen
- particulate contaminants
- gaseous or vapor contaminants Air Purifying Devices
- Dust Masks – used for protection against nuisance dusts such as sawdust, chalk, plant related and sanding dusts. These are generally not suitable for toxic substances.

Face protection must be worn where:

Employees are required to work outdoors and are exposed to the sun's rays. Under this condition, you should:

- Attempt to schedule work that must be completed in full sun
- Use shade wherever possible.
- Wear loose and closely woven clothing (long sleeved, button up, collared shirt, gloves).
- Wear a 10cm wide brimmed hat or hat with a neck flap.
- Use a broad spectrum water resistant SPF30+ sunscreen at least 10–15 minutes before going out in the sun. Reapply every 2 hours while outdoors.
- Drink plenty of water.
- Wear close fitting sun glasses.
- Where insect borne disease may be contracted (e.g Ross River Virus), use appropriate insect repellent.

Hand protection must be worn when:

The number of applications for which hand protection must be provided is very extensive. In general, protection is provided wherever there is a hazard and it is essential that the correct type is used for a specific task.

Foot protection must be worn when:

The type of duties performed require protective footwear. The footwear may also have special characteristics such as protective toecap, thickness and type of upper materials, thickness and type of sole, chemical resistant soles, penetration resistant mid soles and electrical conductive / antistatic properties.

Protection from falls:

A full body harnesses with lanyard attachment at the back should be used, to ensure a person cannot slip out of the harness. Systems must also be put in place to ensure that a person suspended this way can quickly be rescued if the need arises.

Self-Check -5	Written Test

Direction I: Matching item

Direction I: Match items under column 'A' with items listed under column 'B'. Use the space before each questions to write your answers.(2 pt each).

A		B	
1.	Responsibilities of employers	**A.**	Worn by a person who may be struck on the head by a falling object
2.	Protection from falls	**B.**	Periodically reviewing, updating and evaluating the effectiveness of the PPE program.
3.	Welding hand shield	**C.**	Used for protection of our respiratory systems against nuisance dusts such as sawdust, chalk, plant related and sanding dusts
4.	Dust Masks	**D.**	Attend training sessions on PPE
5.	Safety helmet	**E.**	A full body harnesses with lanyard attachment at the back should be used,
		F.	A rigid eye protector which is held in the hand to shield the eyes, face, forehead and front of the neck.

Note: Satisfactory rating – 10 and above pts ***Unsatisfactory - below 10 pts***

Name: _____

Date: _____

Score = _____

Rating: _____

Answer Sheet-1

Matching Questions

1 _____ **4.** _____
2 _____ **5.** _____
3 _____

Operation Sheet -1	Scheduling and conducting routine inspections of Drainage Systems

Techniques of scheduling and conducting routine inspections of drainage systems

Step 1: Prepare all necessary tools and equipments(including PPE) appropriate for the operation.

Step 2: Identify components, structures or activities to be inspected

Step 3: Prepare inspection checklist specific to the purpose

Step 4: Prepare schedule to conduct the inspection.

Step 5: Conduct the inspection using your checklist

Step 6: Take action or report your findings to responsible body

Operation Sheet -2	Collecting data on drainage system performance and usage

The following steps are used to collect data used to assess drainage system performance and usage

Step 1: Prepare all necessary tools and equipments(including PPE) appropriate for the operation

Step 2: Plan for data collection

Step 3: Determine the number of samples to be collected statistically

Step 4: Select data collection method

Step 5: Record and store the data appropriately

Operation Sheet -3	Controlling water sample collection and recording processes

Techniques of controlling water sample collection and recording processes.

Step 1: Prepare all necessary water sampling tools and equipments and use PPE appropriate for the operation.

Step 2: Plan and prepare for water sample collection process

Step 3: Take water sample at an appropriate location/site

Step 4: Label each water sample with correct and appropriate items

Step 5: Store/transport water samples appropriately

LAP Test 1	Practical Demonstration

Name: _____ **Date:** _____

Time started: _____ **Time finished:** _____

Instructions: Given necessary reagents, tools and materials you are required to perform the following tasks within 3 hours.

Task 1: Schedule and conduct routine inspections of drainage systems

Task 2: Collect data on drainage system performance and usage

Task 3: Control water sample collection and recording processes

Instruction Sheet	Learning Guide #47: Regulate and Control Flows and Drainage System

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

- Inspecting flow regulating systems and applying necessary adjustments
- Types of flow regulating systems
- Monitoring discharge flows and applying required diversions
- Controlling processes to maintain parameters of operation.
- Identifying, addressing and reporting problems and operational conditions of the drainage network
- Environmental aspects of drainage systems
- Risk factors and potential hazards involved in drainage systems
- Integrate processes to improve drainage network performance

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:

- Inspect flow regulating systems and apply necessary adjustments to achieve discharge requirements.
- Monitor discharge flows and apply diversions required to facilitate repair or emergency
- Control processes to maintain parameters of operation.
- Identify, address and report problems and operational conditions of the drainage network
- Integrate processes to improve drainage network performance

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below

3. Read the information written in the "Information Sheets 1- 5". Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the "Self-checks 1,2,3,4 & 5" in each information sheets on pages 87, 90, 92, 95 and 97.
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to "Operation sheets 1 on pages 97 and do the LAP Test on page 99". However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity.
7. After You accomplish Operation sheets and LAP Tests, ensure you have a formative assessment and get a satisfactory result; Then proceed to LG 48.

Information Sheet-1	Inspecting Flow Regulating Systems and Applying Necessary Adjustments to Achieve Discharge Requirements

1.1. Introduction

To be able to distribute the water in an irrigation system, control of water levels and regulating and measuring of flows are required. Drainage control is also required, for instance to delay low discharges (measures to prevent drying out) or to temporary store or divert high discharges.

To control the required flow and water levels, measuring and regulating structures are used to guarantee a good water distribution within an irrigation system. In channels flow rates can be determined by measuring the water velocity and the wet area which is related to the water level. Various measuring and regulating structures exist, from very simple weir distribution structures in which everything is fixed and the water proportionally is distributed according to the width of the weirs.

1.2. Irrigation and Drainage Flow Regulating Systems

The following irrigation and drainage flow regulating systems should be inspected regularly for appropriate operation.

1.2.1. Emergency overflow and diversion systems

Escape structures are necessary in open canal systems in the event of incorrect operation, gate failure, or other emergency. Either because of gates being wrongly operated upstream or downstream, too much water coming in at the head works, a blockage downstream, or excess rainwater flooding in during the rainy season, the canal will overflow. On a small canal it may not matter where the overflow takes place. In most cases however it is desirable to control it so that it can be safely channeled away into the drainage system without damaging crops or canal banks.

Overflows are controlled by a spillway, often called escapes when used in a canal. Escapes are usually some form of weir, which comes into action when the water level exceeds a certain height. This is normally established as then maximum regulated water level, plus a

certain amount, typically 150 mm, to accommodate waves and minor fluctuations in level caused by gate operation. Occasionally a siphon spillway might be used.

1.2.2. Discharge controlling systems

The concepts of upstream and downstream control are applied to a sequence of canal reaches separated by cross regulators, or in the case of a pipeline, by pressure-controlling valves. In a canal we can control the water level and the discharge. In a pressurized pipeline we can control the head or pressure, which is analogous to the canal water level, and the discharge. We can easily measure the instantaneous water level or head, but in the field it is much more difficult to directly measure the instantaneous discharge. Hence the importance of water level in canal control theory. Modes of operation of the canal or pipeline system can be categorized as one of these:

Upstream control : Upstream control infers that the discharge in each reach is controlled from its upstream end. Changes in flow emanate in sequence from the head works downstream through the system. Water levels are controlled at the downstream end of each reach by cross-regulators or fall structures, which if adjustable are operated in response to water levels on their immediate upstream side. Off takes are preferably located close to and upstream of the cross-regulators, where water levels are most readily guaranteed.

Figure 11: Upstream control by afloat-operated self-regulating gate

Downstream control: Downstream control means that the discharge in each reach is controlled from the downstream end, either from individually adjusted off takes or automatic cross-regulators. Changes in flow emanate from the tailed and work sequentially upstream though the system. Water levels are controlled at the head of each reach by cross regulators, which open or close in response to water levels on their downstream side.

Off takes are located preferably close to and downstream of cross regulators for minimum fluctuation in parent canal water levels. Low pressure pipelines are excellent conduits for downstream control and are often used in combination with higher level canals which provide intermediate storage. In a low-pressure pipeline the pressure-reducing valves are analogous to the cross-regulators in a canal.

Figure 12: Downstream control gates

Mixed control: Mixed, or composite control, uses the principles of both upstream and downstream control in the same regulation structure, depending on the prevailing water levels. The aim is to escape a potential problem in downstream control, that of the canal running dry through too much abstraction downstream. Mixed control can be realized by appropriate active control technology.

Centralized control: The above modes of operation are all serial they rely on sequential operation of regulators each in response to the action of the next structure upstream or downstream. Centralized control allows the simultaneous operation of all cross regulators, and as such it has to be actively automated.

Centralized control is applicable to long canals with remote controlled cross regulators coordinate by computer at a central office. With centralized control all the cross-regulators can be operated simultaneously so there is no sequential time lag along the canal as there is in a conventional upstream-controlled canal.

Manual Gate Control: On older schemes that gates have to be physically operated (i.e. manually operated) by a man or woman winding a handle, most large gates are equipped with electro hydraulic motors.

The implications of manual control are:

- It entails some form of communication, be it telephone, radio, ditch riders, or farmers' committees, between control points and organisational centres.
- Gate operators and support staff have to be employed, often round the clock, and paid for by the canal operating authority.
- It will be apparent that even a modestly sized canal system will require substantial inputs from its management in terms of organisation, providing trained operators and running expenses.

1.2.3. Intake works

The water intake works require the following services:

- Controlling of sluice gates and scour pipe valves
- Checking the intake chamber cover conditions;
- Checking all the screens positioning and functioning;
- Check coarse and fine screens for blockage and clogging;
- Regular inspection for silt accumulation, cracks, leakages, blockages;
- Check obstruction of flow to or near the weir;
- Check the water level at the intake;
- Regular checking of flush/flood gates and scour pipes.
- Check and adjust the sluice gates to the recommended depth.

1.2.4. Pipe network

- Opening and closing of sluice valves to be done gradually until fully closed or opened to prevent surges, water hammer and air pockets in the pipeline.
- Pressure surveys inspection along all the line to determine any hydraulic problems;
- Flushing: This is accomplished by opening washouts and end caps.
- Regular inspection for leakages (joints, couplers, bends) and bursts;
- Check for any damages of the anchors/thrust blocks, pillars, culverts and marker posts regularly.

1.2.5. Meters

- Regular inspection of the meters for flow rates leakages or blockages;
  Proper and accurate recording of the functioning conditions of the meters;
- Check the meter chambers for damages, water logging and silt.

1.2.6. Valves

- Mark and number all the valves and indicate the locations on the layout;
- When filling the system all valves should be in the open position;
- Operate valves in either direction and determine the number of turns to go fully closed or fully opened positions; show on record card, it gives direction on the level of operation of the system and also when the valve is not properly functioning;
- Check valves for leakages through packing of rings, assembly joints;
- Check air/vacuum valves for leakages past float.
- Do not leave valve in fully opened or closed position, but back off 1-2 turns,
- Regular inspection of pressure reducing valves for any malfunction
- Check all valves, boxes for damage, leakages and silt accumulation.
- Prepare record cards for each valve in the system.
- Inspection of functioning of the valve should be done regularly.

1.3. Gate Operation

Control of the water flow is achieved through the operation of various types of gates. They may be operated manually or under power and controlled manually or automatically, and controlled locally or remotely.

Regulation of an irrigation system involves the following gate operations:

- Discharge control is achieved by opening and closing gates at the head of regulated canal reaches, and at the head or tail of regulated pipeline reaches.
- Water level control is achieved by opening and closing cross-regulator gates to attain target water levels either upstream or downstream of the structure.
- Outlet control is achieved by opening and closing farm, field or watercourse outlets, usually in accordance with a predetermined programme.

Types of gate operation include:

Manual gate operation: The simplest form of gate is a steel leaf sliding in grooves at either side. In small canals of about 100 l/sec discharge or less these are light enough to be lifted open and closed by hand. The operation may be facilitated by a ratcheted lever arrangement, or a screw mechanism.

Figure 13: A lever-operated check gate

Larger gates require mechanical gearing, which can be through a screw-threaded rising or non-rising spindle mechanism, a rack and pinion, a worm drive or beveled gear arrangement, a cable drum winch, or a counterbalanced cable or chain giving a straight

vertical lift. Even when the gates are powered, one of these systems might be provided as a manual override in the event of power failure.

Powered or Motorized Gate Operation: Larger gates can be operated through an electric motor coupled to one of the mechanisms mentioned above, or hydraulically. Hydraulic operation entails pumping oil into a cylinder which activates a ram coupled directly to the gate. The pump would normally be electrically operated, and a manual override facility is also possible, using a lever operated jacking device. Most large gates and all high pressure gates are operated electro hydraulically.

Gate self-operation: Gates intended to react in response to water level can be designed with floats and counterweights such that they will open or close according to water levels on their upstream or downstream side. These are usually radial or flap gates having no moving parts except the entire gate itself.

Self-Check -1	Written Test

Direction I: Multiple choice item

Instruction: Choose the best answer for the following questions and write the letter of your answers in the spaces provided on answer sheet 1. Use bold letter (2 pts each).

1. Flow rates in channels can be determined by:
   A. Measuring the water velocity and the wet area which is related to the water level
   B. Inspecting the canals regularly
   C. Maintaining the channel annually
   D. Replacing the channel with the new one
2. Irrigation system could be regulated by:
   A. Opening and closing gates at the head of regulated canal reaches, and at the head or tail of regulated pipeline reaches to control discharge control
   B. Opening and closing cross-regulator gates to attain target water levels either upstream or downstream of the structure to control water level
   C. Opening and closing farm, field or watercourse outlets, usually in accordance with a predetermined programme to control outlet
   D. All
3. Mode of control system in which the discharge in each reach is controlled from its upstream end is:
   A. Upstream control C. Downstream control B. Mixed control D. Centralized control
4. Emergency overflows are controlled by:
   A. Spillway often called escapes when used in a canal C. Off take structure
   B. Weir D. Cross structures

Note: Satisfactory rating – 8 and above pts ***Unsatisfactory - below 8 pts***

Name: _____ Date: _____

Answer Sheet-1

Multiple Choice Questions

1 _____ **3.** _____

Score = _____

Rating: _____

2 _____ 4. _____

Information Sheet-2	Monitoring Discharge Flows and Applying Diversions Required to Facilitate Repair or Emergency

2.1. Introduction

Not only the difference between the water level in the field channel and the field level, but also the size of the intake opening determines the flow that enters the field: the larger the opening, the larger the flow. Control is good when gated intake structures are used, and also when siphons or spiles are used. When siphons or spiles are used, their number can be adjusted or different diameters used according to the discharge required.

2.2. Monitoring Discharge Flows (Water Level Control)

If the discharge through a field intake is too low to satisfy the farmer's needs, he or she can either enlarge the opening of the intake, or raise the water level upstream of the intake, according to local conditions. When a concrete or masonry structure is used for an intake device, the opening cannot be enlarged. In this case another, larger structure should be constructed.

In most cases, however, the water level in the field channel is raised to increase the flow through an intake. By how much the level can rise depends on the circumstances: if the water level has already reached the freeboard level, a further rise is dangerous and must be avoided.

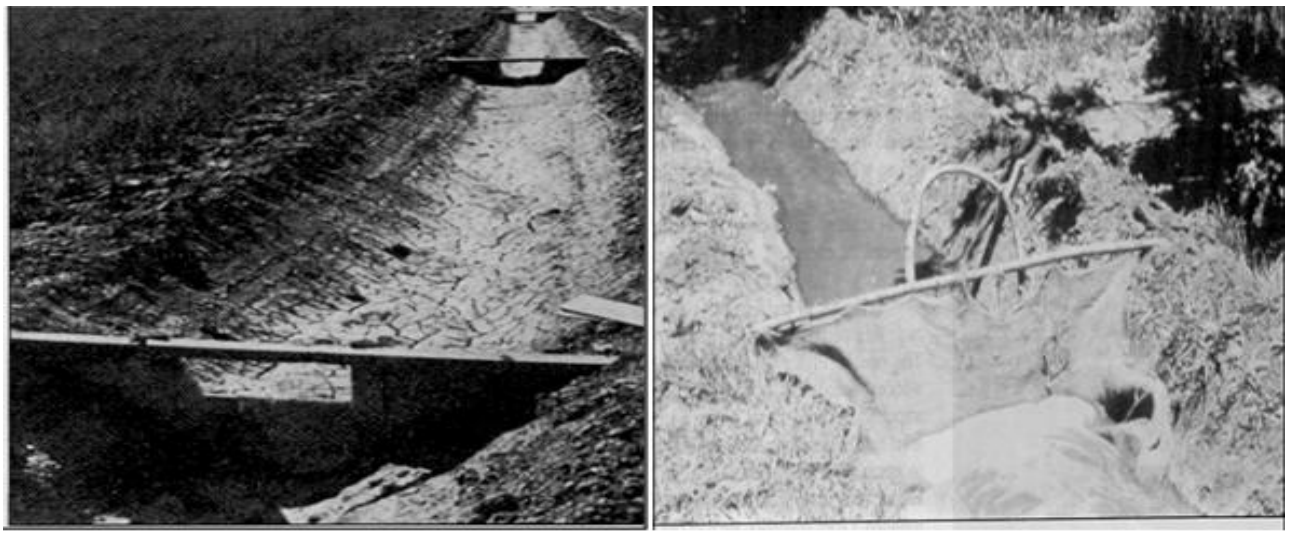


Figure 14: A series of permanent check structures (b) A temporary check structure

If the water has not yet reached the maximum level possible in the channel, the level could be raised by using a so called 'check structure'. A check structure obstructs the flow in the canal and consequently the water level will rise. These check structures can be permanent or they can be temporary. Materials, such as cloth or plastic sheeting, can be used as transportable checks.

2.3. Apply Diversions Required to Facilitate Repair or Emergency

Canals that are supplied with water according to a rotation schedule or on an 'on demand' basis must be equipped with gates at the off take. Sand bags can also be used instead of gates in small tertiary canals.

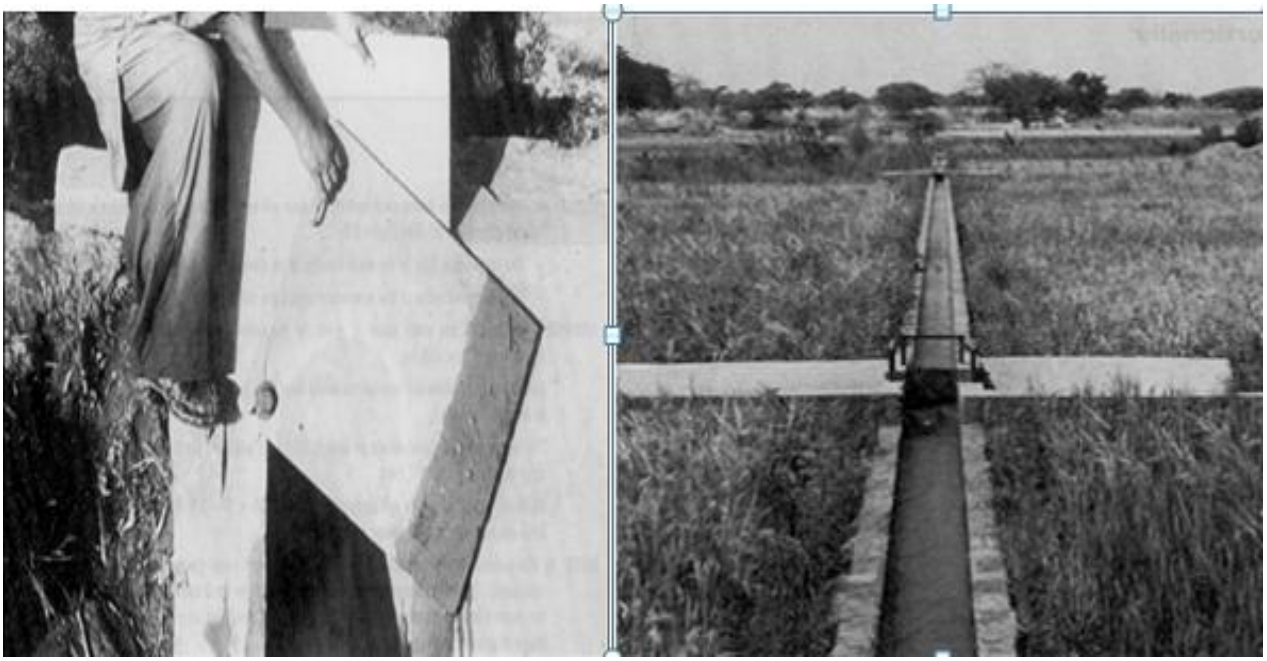


Figure 15: Gated canal off take (b) Canal with simple division boxes

2.4. Temporary Diversion Structures

It is a temporary ridge or excavated channel or combination ridge and channel constructed across sloping land on a predetermined grade. It is used to protect work areas from upslope runoff and to divert sediment laden water to an appropriate sediment trapping facility or stabilized outlet. Temporary diversion structures applies to construction areas

where runoff can be diverted and disposed of properly to control erosion, sedimentation, or flood damage.

Specific locations and conditions include:

- Above disturbed existing slopes and above cut or fill slopes
- Across unprotected slopes, as slope breaks, to reduce slope length;
- Below slopes to divert excess runoff to stabilized outlets;
- Where needed to divert sediment laden water to sediment traps
- At or near the perimeter of the construction area
- Above disturbed areas before stabilization

2.4.1. Design, construction and maintenance of temporary diversion structures

It is important that diversions are properly designed, constructed and maintained since they concentrate water flow and increase erosion potential. Particular care must be taken in planning diversion grades. Too much slope can result in erosion in the diversion channel or at the outlet. A change of slope from steeper grade to flatter may cause deposition to occur. The deposition reduces carrying capacity and may cause overtopping and failure.

It is usually less costly to excavate a channel and form a ridge or dike on the downhill side with the spoil than to build diversions by other methods. Where space is limited, it may be necessary to build the ridge by hauling in diking material or using a silt fence to divert the flow. Use gravel to armor the diversion dike where vehicles must cross frequently. Temporary diversions may serve as in place sediment traps if over excavated 1 to 2 feet and placed on a nearly flat grade. The dike serves to divert water as the stage increases. A combination silt fence and channel in which fill from the channel is used to stabilize the fence can trap sediment and divert runoff simultaneously.

Inspect temporary diversions once a week and after every rainfall. Immediately remove sediment from the flow area and repair the diversion ridge. Carefully check outlets and make timely repairs as needed. When the area protected is permanently stabilized, remove the ridge and the channel to blend with the natural ground level and appropriately stabilize it. Frequent inspection and timely maintenance are essential to the proper

functioning of diversions. Sufficient area must be available to construct and properly maintain diversions.

Self-Check -2	Written Test

Direction I: Short Answer Item

Instruction: Give the correct answer for the following questions and write the letter of your answers in the spaces provided on answer sheet 1.

1. Discuss factors which determine the size of the flow that enters the irrigation field(2 points).
2. Mention at least 4 specific locations where diversion structures are placed(4 points).
3. Enumerate types and purposes of diversion structures(2 points).
4. How you maintain and operate diversion structures?(2 points).

Note: **Satisfactory rating – 10 and above pts** **Unsatisfactory - below 10 pts**

Name: _____ Date: _____

Answer Sheet-1

Sort Answer Questions

Score = _____

Rating: _____

1. _____
   _____
   _____
   _____
2. _____
   _____
   _____
   _____
3. _____
   _____
   _____
   _____

4. _____

_____

_____

Information Sheet-3	Controlling Processes to Maintain Parameters of Operation

3.1. Overview of Maintaining Irrigation and Drainage Parameters of Operation

In operation of irrigation and drainage systems parameters of operation including factors affecting the quantity and quality of irrigation and drainage water should be maintained the processes controlled. These include irrigation and drainage structures, discharges from irrigation and drainage systems, flow of water and the quality of irrigation and drained water.

3.1.1. Drainage Structures

Condition of hydraulic and drainage structures affect the quantity and quality of irrigation and drainage water. Like any system, drainage systems require maintenance to perform correctly. The maintenance required depends on the type of drainage system ; tile and ditch systems have different maintenance needs. Maps of the location of ditches, outlets, and buried tile and should begin with periodic inspections of the system.

Ditches: Ditch systems should be inspected regularly for any obstructions or impedance to flow in the ditch, bed erosion, or bank failures. Similarly, ditches can fill in with sediment from surrounding fields or upslope contributing areas, further reducing conveyance capacity. Vegetation can grow rapidly in ditches, which reduces the ability of the ditch to convey water.

Some of the measures to control irrigation and drainage water processes and maintain ditches include:

- Obstructions should be removed as they are encountered, and any bed erosion or bank failures should be repaired and comply with design standards .
- A ditch management plan should include vegetation and sediment control measures.
- Sediment control usually involves periodic “dip-outs” (scraping) of sediments that

have accumulated in the ditch.

- Vegetation can be controlled by mowing, pasturing of livestock, burning, applying chemicals, or mechanical removal (scraping).
- Any junctions where two or more ditches meet should be inspected for erosion or scour and fixed as appropriate.
- Grade stabilization should be employed periodically to ensure the ditch maintains its design capacity.

Tile Outlets: Tile systems and outlets should be inspected regularly as well. Given that these systems are underground and more difficult to visually inspect, one of the best times to assess system function is during periods of high drain flow.

Measures used in controlling irrigation and drainage water processes and maintain tile drainage outlets are:

- Verify that all tile outlets are flowing freely and that the flow is sediment-free.
- Sediment in the tile flow could indicate a failure in the tile system in the field. Any debris encountered at the outlets should be removed; a submerged tile outlet can cause back pressure in the tile system and lead to blowouts.
- Walk the field in which the tiles are installed and make sure there are no blowouts, sinkholes, or animal burrows that could allow sediment or surface contamination to enter the tile system; repair them as necessary. Wet spots in new locations could be an indication of a clogged or damaged tile, and careful excavation and repair could be required.

3.1.2. Runoff

Any drainage installation is sized according to the probability of occurrence of an expected peak discharge during the design life of the installation. This, of course, is related to the intensity and duration of rainfall events occurring not only in the direct vicinity of the structure, but also upstream of the structure.

The volume of stream flow depends on:

The size of the drainage area: The larger the area, the greater the volume of runoff. An estimate of basin area is needed in order to use runoff formulas and charts.

Topography: Runoff volume generally increases with steepness of slope. Average slope, basin elevation, and aspect, although not often called for in most runoff formulas and charts, may provide helpful clues in refining a design.

Soil: Runoff varies with soil characteristics, particularly permeability and infiltration capacity. The infiltration rate of a dry soil, by nature of its intrinsic permeability, will steadily decrease with time as it becomes wetted, given a constant rainfall rate. If the rainfall rate is greater than the final infiltration rate of the soil (infiltration capacity), that quantity of water which cannot be absorbed is stored in depressions in the ground or runs off the surface

A number of different methods are available to predict peak flows. Flood frequency analysis is the most accurate method employed when sufficient hydrologic data is available. The probability of occurrence of peak flows exceeding the design capacity of a proposed stream crossing installation should be determined and used in the design procedure.

3.1.3. Flow Control in Irrigation and Drainage Systems

The flow of irrigation water in the canals must always be under control. For this purpose, canal structures are required. They help regulate the flow and deliver the correct amount of water to the different branches of the system and onward to the irrigated fields.

Erosion control structures

Canal erosion: Canal bottom slope and water velocity are closely related, as the following example will show. A cardboard sheet is lifted on one side 2 cm from the ground. A small ball is placed at the edge of the lifted side of the sheet. It starts rolling downward, following the slope direction.

Water poured on the top edge of the sheet reacts exactly the same as the ball. It flows downward and the steeper the slope, the higher the velocity of the flow. Water flowing in steep canals can reach very high velocities. Soil particles along the bottom and banks of an earthen canal are then lifted, carried away by the water flow, and deposited downstream where they may block the canal and silt up structures.

Drop structures: Drop structures or chutes are required to reduce the bottom slope of canals lying on steeply sloping land in order to avoid high velocity of the flow and risk of

erosion.

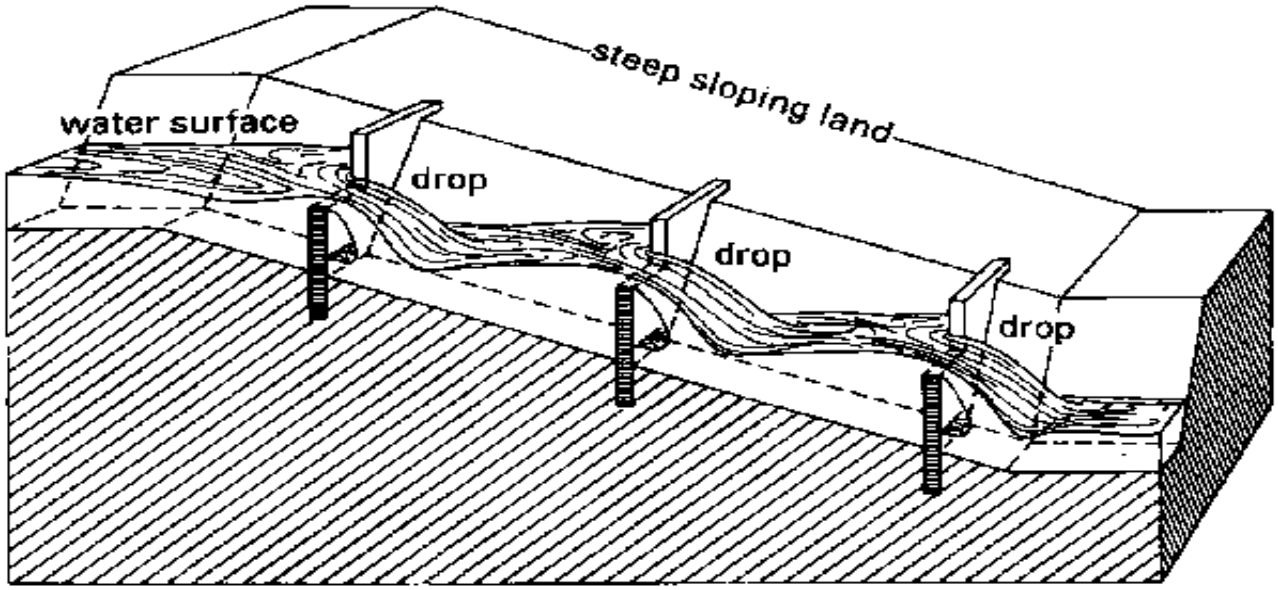


Figure 16: Longitudinal section of a series of drop structures

Distribution control structures

Distribution control structures are required for easy and accurate water distribution within the irrigation system and on the farm.

Division Boxes: Division boxes are used to divide or direct the flow of water between two or more canals or ditches. Water enters the box through an opening on one side and flows out through openings on the other sides. These openings are equipped with gates.

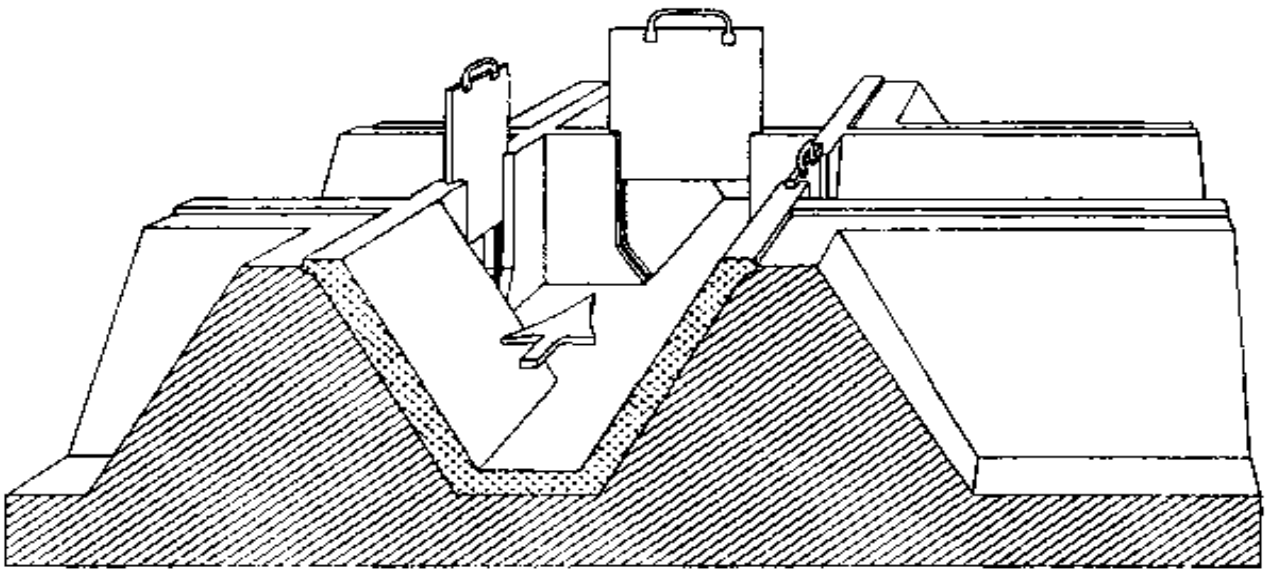


Figure 17: A division box with three gates

Pipe Turnouts: Turnouts are constructed in the bank of a canal. They divert part of the water from the canal to a smaller one.

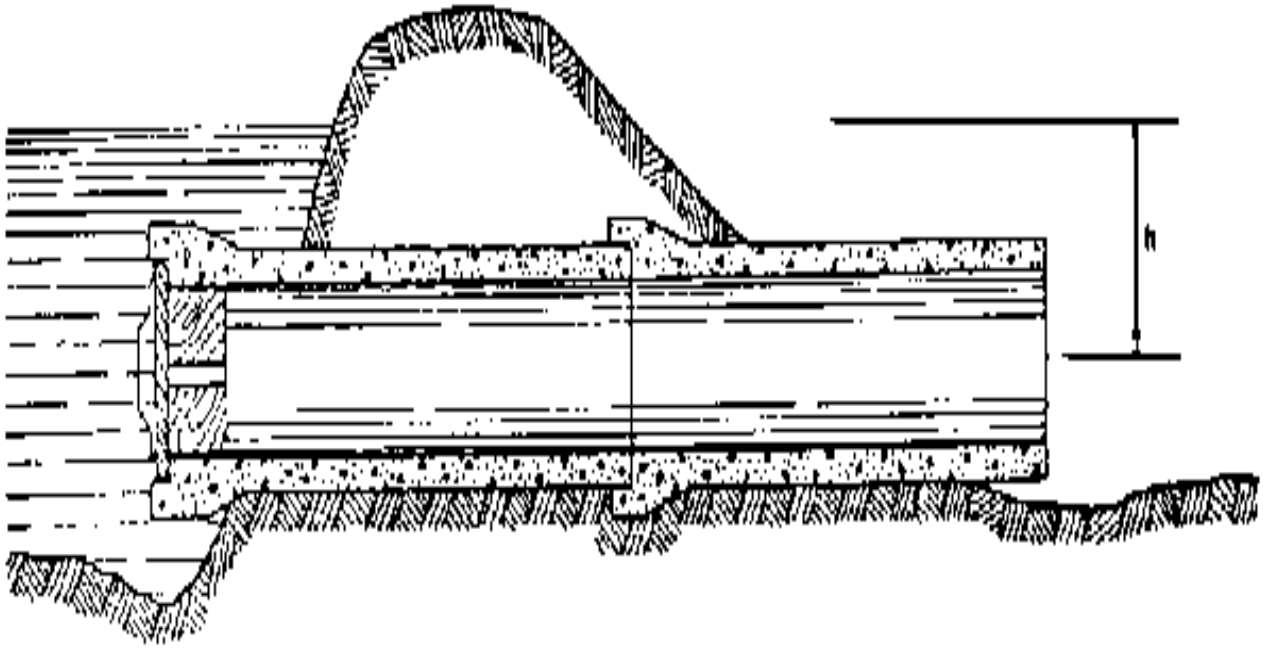


Figure 18: A pipe turnout

Check structures: To divert water from the field ditch to the field, it is often necessary to raise the water level in the ditch. Checks are structures placed across the ditch to block it temporarily and to raise the upstream water level. Checks can be permanent structures or portable.

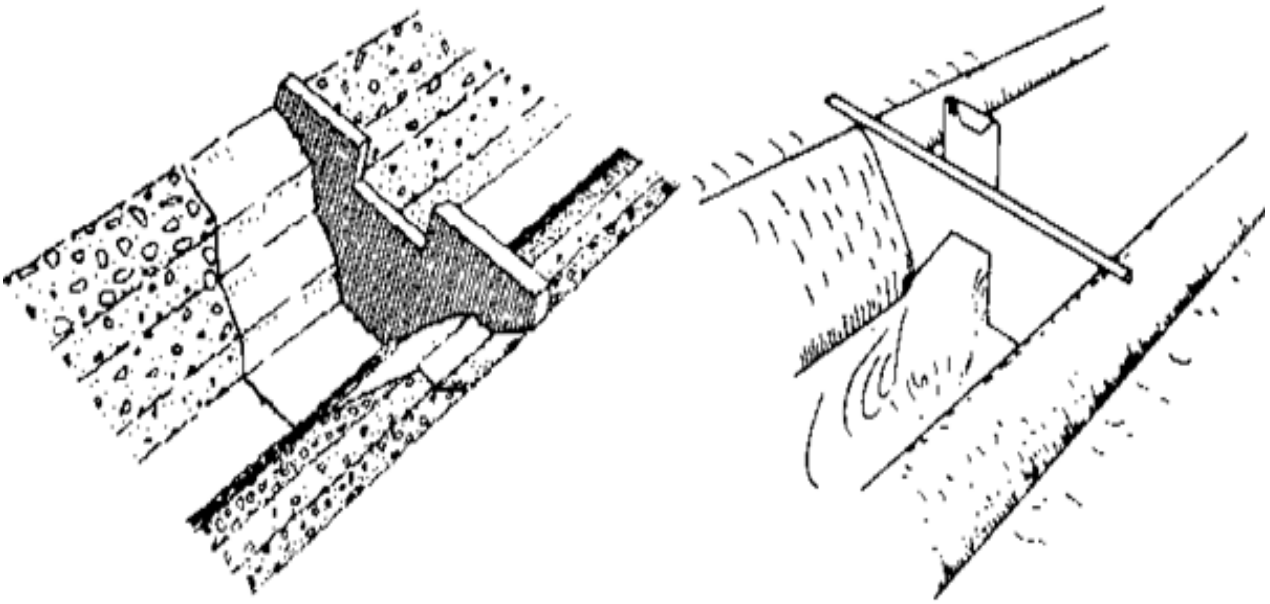


Figure 19: A permanent concrete check Figure 20: A permanent concrete check

3.1.5. Maintaining Irrigation and Drainage Water Quality

Water quality management is a critical element in the maintenance of sustainable irrigated agriculture systems. The management of water quality requires thorough attention to all aspects of the water regimen from the water source until disposal.

Many aspects such as water quality assessment, water source protection, irrigation water management, salinity management, water table management, management and disposal of drainage water, as well as the monitoring and evaluation system require consideration and controls to protect the water quality for an irrigated area and for downstream users.

Controlling irrigation water quality within the scheme requires good field and scheme level management, proper agronomic practices to control salinity and pollution, sound salinity management practices to permit reuse of water when appropriate and water table control where conditions permit.

The management and disposal of drainage water that is to leave a scheme, should involve consideration of using saline drain water for salt tolerant plants, biological and chemical treatments, constructed wetlands, stabilization ponds, evaporation ponds, dilution of disposed drain water and final discharges that consider downstream users.

Self-Check -3	Written Test

Direction I: Match items under column 'A' with items listed under column 'B'. Use the space to write your answers. Use bold Letters (2 pt each)

A		B	
1.	Check structures	**A.**	Structures used to divide or direct the flow of water between two or more canals or ditches.
2.	Topography	**B.**	Structures placed across the ditch to block it temporarily and to raise the upstream water level
3.	Drop structures	**C.**	Factor affecting the volume of runoff
4.	Discharge	**D.**	Used to divert part of the water from the canal to a smaller one.
5.	Pipe Turnouts	**E.**	Structures required to reduce the bottom slope of canals lying on steeply sloping land in order to avoid high velocity of the flow and risk of erosion.
		F.	Parameter of irrigation and drainage system operation

Note: **Satisfactory rating – 10 and above pts** **Unsatisfactory - below 10 pts**

Answer Sheet-1

Name: _____ Date: _____

Matching Questions

1 _____ **4.**_____
2 _____ **5.** _____
3 _____

Score = _____

Rating: _____

Information Sheet-4	Identifying, Addressing and Reporting Problems and Operational Conditions of the Drainage Network

4.1. Introduction

Development of modern irrigation and drainage networks is one of the effective strategies to preventing water losses and optimal usage of water resources in agricultural section. The nature and type of these problems are different depending on the stages of construction and operation in different networks.

4.2. Drainage Network

It is a network of channels and drains constructed on marshy or excessively wet land. It is the key element of a drainage system and consists of regulating, protecting, and conducting networks with drainage outlets, manholes, over falls, chutes, bridges, pipe crossings, and other such structures.

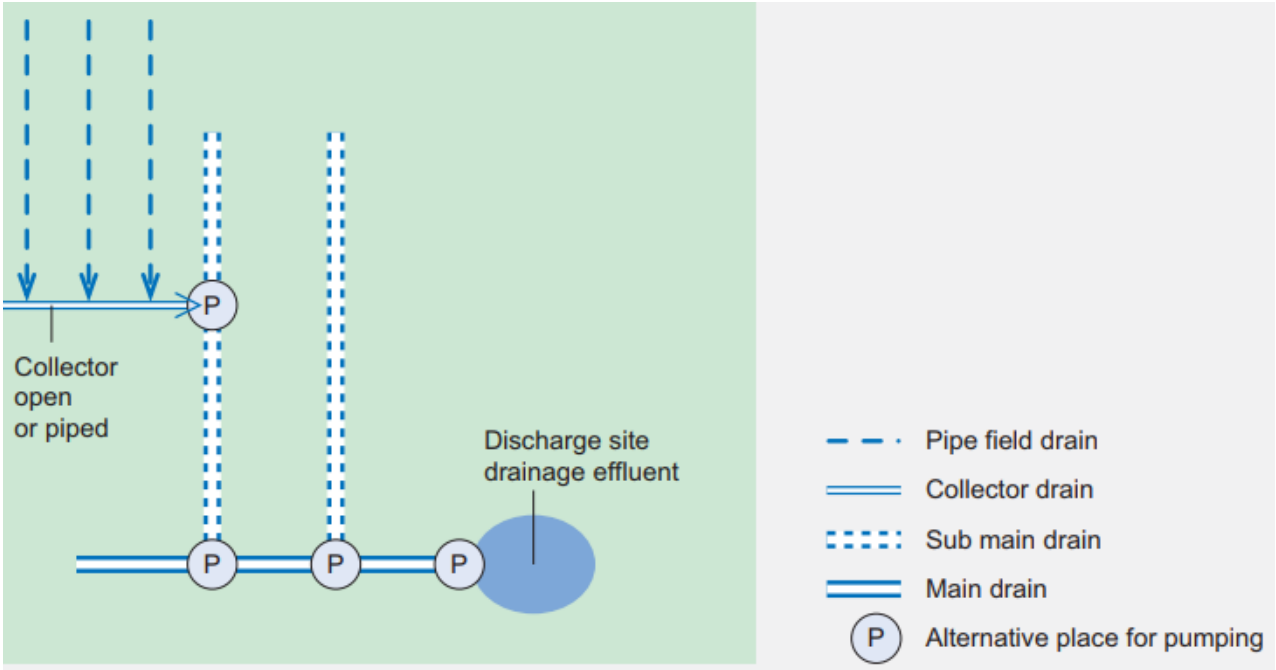


Figure 21: Drainage Networks

A drainage system consists of the following elements :

Field drains: Field drains control the water table and collect the excess water in the soil or from the groundwater and convey this drainage effluent towards the collector drain.

Collector drains: Collector drains can be either open or piped. Open drains convey rain and groundwater towards the main drainage system and piped collectors only convey the drainage water from the field drains towards the main drainage system.

Sub main and main drains: The main drainage system, which consist of several sub mains (if applicable) and a main drain, conveys the drainage water from the collectors towards the discharge site. Main drains are normally open drains, although theoretically these main drains can be pipes, the required diameters are generally very large and therefore prohibitively expensive.

Discharge site: The discharge site or outlet is the terminal point of the entire drainage system from where the discharging is done into a river, lake or sea. The outlet can be a gravity outlet structure or a pumping station. A gravity outlet structure is a drainage structure in an area with variable outer water levels where drainage can take place by gravity when outside water levels are low.

In delta areas, drainage by gravity is often restricted to a few hours per day during low tide. In the upstream regions of a river, drainage by gravity can be restricted for several weeks during periods of high river discharges. A pumping station will be needed in areas where the required water levels in the drainage system are lower than the water level of the river, lake or sea.

4.2. Major Problems and Operational Conditions of the Drainage Network

In order to classify the major problems involved with different networks, all problems of different networks should be listed with details and then analysed.

Salinization: Salinization is one of the most common and most costly environmental consequences of inadequate drainage in irrigation areas. It occurs either because irrigation water contains dissolved solids and evaporation from fields leaves behind a salt burden, or because excessive applications of water cause the water table to rise, bringing old salt deposits to the surface.

If the surface soils already contain a high salt concentration from one of these causes, then a small excess of irrigation water (the leaching fraction) needs to be applied to gradually wash the salt to either deeper groundwater or to drainage systems . If the salt is

brought to the surface by rising groundwater tables, then irrigation water needs to be applied carefully to prevent excess deep percolation, thereby lowering the water tables and conserving surface water supplies.

Salinity buildup will reduce the yield of crops that are sensitive to the particular salts that accumulate. Changing to less sensitive crops will reduce this problem, temporarily. An imbalance between salt ions, most notably an excess of sodium in comparison with calcium and magnesium, can degrade soil structure . For example, clay particles in soil may swell or form a crust when wetted, reducing or preventing water infiltration, or they may clump, reducing air penetration and water holding capacity.

Acidification: Acidification refers to the process of increasing soil acidity, either due to irrigation with acidic water or drainage of lands that contain high concentrations of unoxidized organic matter. The first cause is not common, and can be avoided through monitoring of irrigation water quality, lime addition, or other means of buffering soil against excess acidity. The second cause is more widespread and more serious. Swamps and mangrove forests often accumulate unoxidized organic matter as stagnant or brackish water is depleted of oxygen by decomposition of organic matter. Drainage can exposeorganic matter, which then oxidizes, releasing more organic acids that are in turn degraded by bacteria. Acid-sulphate soils are an extreme example of a drainage-induced acidification problem , where the pH can drop to 3.

Water logging : Water logging occurs when near-surface soils become saturated due to either a rise in the water table or water becoming trapped near the surface due to an impermeable sub-soil layer. Water logging can cause fields and nearby lands to flood easily. It makes access to fields(other than rice paddy) more difficult, and prevents air from penetrating soil pore spaces. Lack of air in soil leads in turn to the death of many species of worms and other soil organisms that aerate the soil and make nutrients available to crop species.

Soil erosion, borne either by wind or water, is relatively common, leading to nutrient loss as well as depleting the top soil. Less topsoil may not be a problem initially, but can eventually make rooting difficult for plants and make them more susceptible to being uprooted by wind or water. Wind-borne erosion is less common, but can be quite severe if the soil structure has been degraded by other factors such as Salinization.

4.3. Environmental Aspects of Drainage Systems

While drainage has clear benefits to crop production, there are also several negative environmental consequences of drainage. Because conventional drainage management emphasizes the export of water rather than the prudent management of local water tables (generally resulting in excessive drainage) there is the possibility of excessive nutrient export from tile-drained fields.

In addition, routine ditch management practices, including scraping and vegetation management, can minimize the internal cycling of nutrients in ditch vegetation and destabilize ditch walls, resulting in erosion and water quality concerns. Some drainage best management practices to reduce off-site losses of undesirable contaminants into receiving waters begin with implementing good nutrient and pesticide management to reduce nutrient or herbicide losses from the plant root zone, using winter cover crops to sequester nutrients and reduce erosion, and rotating row crops with perennials in the cropping system.

Unfavorable side effects of drainage on natural resources (soils and water) and on wetlands and the landscape include:

- Changes in hydrological peaks can affect downstream areas.
- The discharge of often saline drainage effluent can harm downstream areas.
- Soluble substances such as those causing eutrophication, remnants of pesticides and herbicides, and other pollutants or toxic substances (e.g. from urban and industrial areas) usually collect and concentrate in drainage water, notably in arid and semi-arid regions. They may enter the food chain through aquatic life and crops irrigated with drainage water.
- Disposal options for drainage water, such as evaporation ponds and outflow drains, and water treatment options, especially stabilization ponds and water desalination plants, can become sources of pollution and, thus, become hazardous.
- Banks of open drains can be eroded by water if they are not adequately designed and maintained. Moreover, even soils in flat areas can be eroded if surface runoff is not managed properly.
- Subsidence and irreversible desiccation of peat soils are common side-effects where such soils are drained improperly.

- Acid sulphate soils can form where lands of tropical swampy areas with soils rich in iron sulphate (FeSO4) are drained.
- The draining of lands adjacent to wetlands or higher-lying cropped areas can have negative effects on their groundwater levels.
- Straight layouts of the main drainage system can alter natural watercourses and have a negative impact on the riparian natural vegetation and the landscape.

Care must be take in selecting discharge points to minimize environmental problems from drain discharges. It is important to monitor the water quality from these discharges to watch for significant changes in the drainage effluent that could lead to environmental problems. If changes are noted, steps should be taken to alleviate the problem condition that has developed in the irrigation area or other contributing watershed.

4.4. Impacts of Drainage

Drainage has many impacts, of which the main categories are agricultural impacts, public health impacts, protection of buildings and roads, and ecological impacts. In planning and designing drainage interventions these impacts are not equally addressed.

Drainage's impact on agricultural production and productivity can be substantial, agricultural drainage investments may have short payback periods, but drainage planning needs a relatively long planning horizon and flexibility because drainage needs may change over time.

Agricultural drainage has often had negative effects on ecological functions and has also acted as a conduit for the spread of wastewater and other pollutants. However there are examples of drainage enhancing ecological functions, but substantially more emphasis needs to be put on mitigating drainage's negative effects and balancing its impact on production functions with that on other functions.

Self-Check -4	Written Test

Direction I: Multiple choice item

Instruction: Choose the best answer for the following questions and write the letter of your answers in the spaces provided on answer sheet 1. Use bold letter (2 pts each).

1. **A** drain which control the water table and collect the excess water in the soil or from the groundwater and convey this drainage effluent towards the collector drain is:

   A. Field drain C. Sub main drain

   B. Main drain D. Main drain

2. Unfavorable side effects of drainage on natural resources may **not include:**

   A. Changes in hydrological peaks can affect downstream areas.

   B. The discharge of often saline drainage effluent can harm downstream areas.

   C. Eutrophication

   D. None

3. It occurs when near-surface soils become saturated due to either a rise in the water table or water becoming trapped near the surface due to an impermeable sub-soil layer.

   A. Water logging C. Soil erosion

   B. Acidification D. Side slope collapse

4. It occurs because excessive applications of water cause the water table to rise, bringing old salt deposits to the surface.

   A. Water logging C. Soil erosion

   B. Acidification D. Salinization

Note: **Satisfactory rating – 8 and above pts** **Unsatisfactory - below 8 pts**

Name: _____ Date: _____

Score = _____

Rating: _____

Answer Sheet-1

Multiple Choice Questions

1 _____ **3.** _____

2 _____ **4.** _____

Information Sheet-5	Integrating Processes to Improve Drainage Network Performance

5.1. Introduction

Irrigation drainage network performance could be improved by integrating different processes in the system. The following processes should be integrated to improve drainage network performance.

5.2. Improving irrigation water conveyance and application efficiency

Increasing the irrigation efficiency within the project area may reduce the amount of drainage water to be disposed of. Sound irrigation application is necessary in order to reduce surface runoff water losses.

Improving irrigation water conveyance and application efficiency is done:

- improving local and regional scheduling of irrigation supplies;
- improving the irrigation practice in order to eliminate surface runoff;
- ensuring uniform water application over all the field;
- adjusting the irrigation requirements to the actual evapotranspiration needs considering the soil moisture storage capacity, while ensuring the annual leaching requirement for salinity control;
- making optimal use of rainfall in the annual salt/water balance in order to reduce irrigation applications in the drier part of the year;
- improving the existing surface irrigation systems;
- changing to pressurized systems, such as sprinkler or drip irrigation.

5.2. Proper Placement of Outlet Structures

The drainage water outlet is a critical point in any project, both from a viewpoint of downstream water quality and for the functioning of the project itself, because any flow stagnation in the conveyance channels causes problems upstream. Therefore, attempts must be made to prevent erosion and not locate outlet structures at points where heavy siltation may be expected. Moreover, the adverse downstream negative impacts on water supplies, fish, riparian habitats, wetlands and other valuable ecosystems must be minimized.

5.3. Drainage system modifications to facilitate participatory management

Monitoring and evaluation systems are critical to the successful management of drainage systems. Design of the M&E system is best done in conjunction with the designs for infrastructure modification or addition.

Monitoring plans should be developed during the design stage with the users groups that will operate the system, the supervising governmental organization, user group and/or other organizations that have stakes in the M&E of system performance. A system for prompt feedback to system operators and maintenance staff should be included. Timely modifications, adjustments and maintenance are critical for successful project operations.

Structure and facility modifications are sometimes necessary in order to enable improved participatory management. Controls and regulation equipment should be designed with the consent and ability of the users organization in mind. Similarly, measurement devices and monitoring equipment should consider the users organizations' information needs and operation abilities. The individuals operating the facilities should understand any automation facilities fully. Training to ensure that controls, devices and equipment are operated and maintained properly as important as having the facilities.

Improving drainage of agricultural fields can be achieved by three primary means:

- installing subsurface, artificial "tile" (perforated pipe) drains at some depth below the soil surface;
- surface ditching; and/or
- land shaping (usually used with either ditching or subsurface drainage).

Selection of a drainage system depends in part on the drainage problem that exists and the particular soil characteristics causing the problem. Both the subsurface tile drainage and ditch-type systems function to lower the water table in the soil below the crop's root zone, while land shaping prevents water ponding on soils with very low infiltration capacity by building a crown or convex surface to direct surface flow from the field.

Self-Check -5	Written Test

Direction I: Multiple choice item

Instruction: Choose the best answer for the following questions and write the letter of your answers in the spaces provided on answer sheet 1. Use bold letter (2 pts each).

1. Where is the appropriate locations of outlet structures ?
   A. at points where heavy siltation may be expected
   A. at any point in the drainage network
   A. at points where lower siltation may be expected.
   D. at the upstream position in the site
2. Selection of a drainage system depends on:
   A. The drainage problem that exists C. The discharge
   B. The particular soil characteristics causing the problem. D. All
3. Methods used to improve irrigation water conveyance and application efficiency is:
   A. improving the existing surface irrigation systems;
   B. changing to pressurized systems, such as sprinkler or drip irrigation.
   C. improving local and regional scheduling of irrigation supplies;
   D. improving the irrigation practice in order to eliminate surface runoff E. All
4. Improving drainage of agricultural fields can be achieved by three primary means:
   A. installing subsurface, artificial “tile” (perforated pipe) drains at some depth below the soil surface;
   B. surface ditching C. land shaping D. All

Note: **Satisfactory rating – 10 and above pts** **Unsatisfactory - below 10 pts**

Name: _____ Date: _____

Answer Sheet-1

Multiple Choice Questions

1 _____ **3.** _____
2 _____ **4.** _____

Score = _____

Rating: _____

Operation Sheet -1	Monitor discharge flows and apply diversions required to facilitate repair or emergency

Activity 1: Apply flow diversions required to facilitate repair or emergency

To undertake this activity, use the following steps.

Step 1: Select appropriate tools and equipments and wear appropriate PPE

Step 2: Select type of temporary diversion appropriate for your work

Step 3: Identify where to locate your temporary diversion structure

Step 4: Install or construct the diversion structure to divert the water temporarily

Step 5: Proceed to the emergency work

Activity 1: Repair small leak in lined irrigation canal

The following steps provide techniques of repairing small leak in irrigation canals. Observe the following figure.

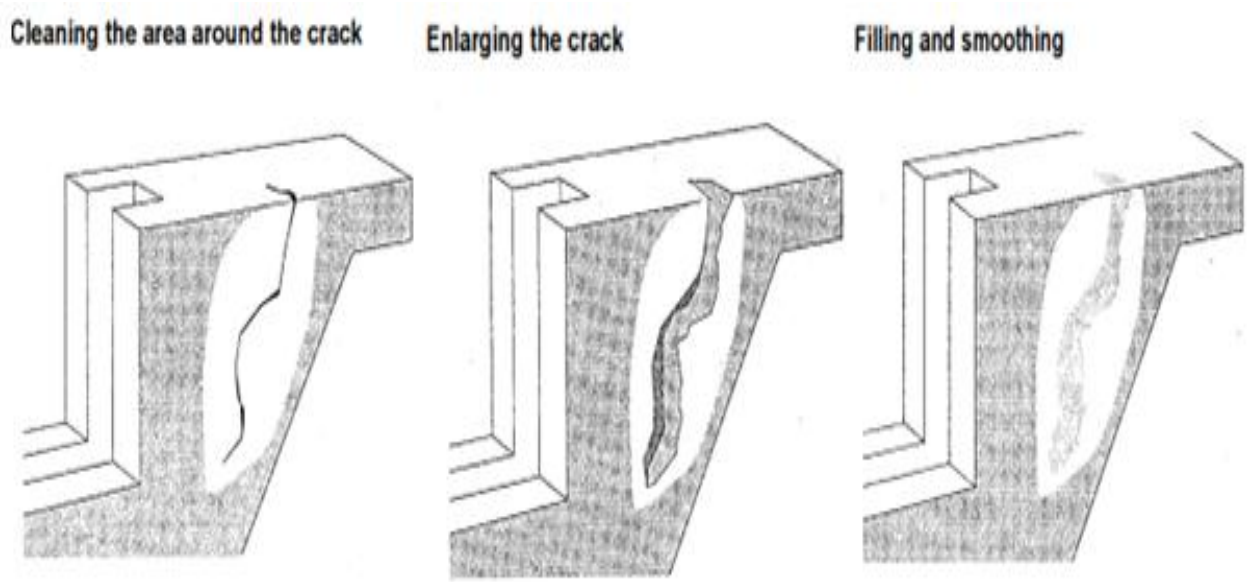
Step 1 : Select appropriate tools and equipments and wear appropriate PPE

Step 2: Clean the wall or the floor round the crack. Remove any sand, clay and plant growth

Step 3: Make the crack larger and deeper.

Step 4: Fill the hole with a cement-sand mortar and smooth with a trowel.

Step 5: Clean, maintain and store tools and equipments at their appropriate place.



Operation Sheet -2	**Adjusting irrigation and drainage water flow using manually operated gates**

The following steps provide **techniques of controlling water level in irrigation and drainage channel.**

Step 1: Prepare appropriate tools and equipments and wear PPE.

Step 2: Identify the location of the gate on the system.

Step 3: Identify the type of the gate you are going to operate.

Step 4: Operate the gate and control the water level in the irrigation and drainage channel.

LAP Test 1	Practical Demonstration

Name: _____ **Date:** _____

Time started: _____ **Time finished:** _____

Instructions: Given necessary reagents, tools and materials you are required to perform the following tasks within ***6 hours.***

Task 1: Construct flow diversions required to facilitate repair or emergency

Task 2: Repair small leak in lined irrigation canal

Task 3: Control water level in irrigation and drainage channel using manually operated gates

Instruction Sheet	Learning Guide # 48: Solve Problem and Make Decision

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

- Identifying workplace problems
- Initiating short term action to resolve the immediate problem.
- Analysing problems for long term impact and assess potential solutions
- Encouraging team member to participate in solving problem process
- Taking follow up action to monitor the effectiveness of solutions

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 workplace problems from an operational and customer service perspective
- Initiate short term action to resolve the immediate problem.
- Analyse problems for long term impact and assess potential solutions
- Encourage team member to participate in solving problem process
- Take follow up action to monitor the effectiveness of solutions in the workplace.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below
3. Read the information written in the “Information Sheets 1- 5”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks 1,2,3,4 & 5” in each information sheets on pages 87, 90, 92, 95 and 97.
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-checks).

6. If you earned a satisfactory evaluation proceed to “Operation sheets 1 on pages 97 and do the LAP Test on page 99”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity.
7. After You accomplish Operation sheets and LAP Tests, ensure you have a formative assessment and get a satisfactory result; Then proceed to the next LG.

Information Sheet-1	Identifying Workplace Problems from an Operational and Customer Service Perspective

1.1. Introduction

Problem solving and decision making are two key tasks of any manager. The ability to deal quickly and effectively with workplace problems are standard ongoing requirements for any manager and will be a significant indicator of your effectiveness.

1.2. Problems

The very nature of problems is that they are often unexpected and they seem to come at the worst of times, such as when you are busy, short staffed or dealing with another problem.

They can show up in many ways, for example, as:

- Complaints
- Poor staff performance
- Failing equipment
- Orders not being processed as required, within set timelines
- Stress
- Staff absenteeism
- Decreases in takings and patronage.

An experienced manager recognizes dealing with these issues as they arise and before they fully develop is what makes good management.

1.3. Solutions

A solution to a problem has the best chance of succeeding if:

- It is made early on when the problem first surfaces
- It includes those who are directly involved, or the reasons for the decision are explained to those who are not directly involved.
- It is in-line with stated organisational goals
- It aligns with organisational policies, vision, values etc
- All the implications of the decision have been thought through.

1.4. Programmed and non-programmed decisions

In the irrigation and drainage industry, like many others, decisions can be described as either "programmed" or non-programmed" judgment decisions. Programmed decisions are those decided beforehand in response to regular occurrences.

Non-programmed decisions are those where the person responsible uses their judgment and discretion to make a decision within agreed boundaries or scope of authority. This may happen for a problem that has not come up before, where the circumstances are different or where there are other contributing factors.

Making a judgment about what to do is made easier with experience, but there are some guidelines to help:

- Look at each situation carefully, considering its specific circumstances. Never rush into a decision and don't be pressured into making a rushed decision. Often, situations are not what they first appear to be.
- Think of the implications of any decisions you make. For example, is it going to be seen as setting a precedent? Will it cost too much? Who will it affect? Is it legal or otherwise acceptable?
- Make sure you are authorized to make the decision. Do you need to check with someone else first? Do you need to refer the decision on to someone else?
- Ask yourself as objectively as possible, whether the decision is fair and justifiable?
- Check whether the decision fits with organisational objectives and mission
- Remember, there is often more than one acceptable solution to a problem. Spend a bit of extra time looking for second and third alternative as opposed to the one you initially think of.

1.5. Problem Solving

Identifying the problem: Often a problem will be obvious to all concerned. But sometimes it is not easy to work out what the problem is. All that is known is there are complaints, results not achieved or staff seem to be unhappy. It is important to take time to thoroughly investigate what the problem or issue is before taking any action.

Problem identification can be done by:

- Looking at the facts

- Talking with people and listening to their views
- Walking around the premises and observing
- Isolating some factors.

Considering options: Once the problem has been identified you need to:

- Identify your desired outcomes.
- Also consider outcomes from an operational and a customer service perspective.
- Look at what alternative options you have for solving the problem.
- Sometimes there will only be one real option, whilst at other times there are a variety of options to pick from.

Options can be canvassed by:

- Meeting with staff to jointly come up with a solution
- Researching options
- Seeking expert advice
- Speaking to your supervisor
- Evaluating the alternatives and selecting the most suitable option.

Making Decision: Factors to consider when making a decision are:

- Who will be involved in the decision making process
- How acceptable the decision is to all relevant parties – customers, staff and management
- The impact of the decision – immediately and in an ongoing way
- The cost of the decision and whether you have the resources to implement it
- Whether your decision is likely to fix the real problem or just cover it up.

Convey the decision to relevant parties: It is important to convey the decision to all relevant parties, together with an explanation of the reason for the decision. In particular, it helps to provide an explanation if a change is being made. Sometimes it is best to provide this information in writing as well as in person.

Reviewing the decision and making adjustments as necessary: It is important to build in a review process. This involves checking to see if there has been an improvement to the original problem. If not, you might have to look at another option.

Self-Check -1	Written Test

Instruction I: Matching

Direction I: Match items under column 'A' with items listed under column 'B'. Use the spaces provided in answer sheet to write your answers. Use bold Letters (2 pt each).

A	B
1. Programmed decisions	**A.** Reviewing the decision and making adjustments as necessary
2. Problems	**B.** Decided beforehand in response to regular occurrences.
3. Problem solving	**C.** Factors to consider when making a decision
4. Impact of decision	**D.** Make sure you are authorized to make the decision.
5. Guideline for making judgement	**E.** A decision made by responsible person using their judgment and discretion within agreed boundaries or scope of authority.
	F. Poor staff performance

Note: **Satisfactory rating – 10 and above pts** **Unsatisfactory - below 10 pts**

Answer Sheet-1

Name: _____ Date: _____

Matching Questions

1 _____ **4.**_____
2 _____ **5.** _____
3 _____

Score = _____

Rating: _____

Information Sheet-2	Initiating Short Term Action to Resolve the Immediate Problem

2.1. Introduction

Actions taken within an operation workplace context can be seen as either short term action or long term action. Where service is paramount, it is sometimes necessary to take short term action to solve a problem until it can be looked at more closely and the problem dealt with more thoroughly.

2.2. Reasons for short term action

Reasons for this include:

- Pressure of work often means there just isn't time to stop and analyse the problem more carefully and in more detail.
- To provide the necessary or expected services to the customer.
- To meet OHS requirements.
- To deal with a complaint.
- To get staff working together again.
- To give you time to analyse and work through the problem at a later date.

Usually these stop-gap measures are not satisfactory in the long term as they are often more costly and they do not prevent the problem from recurring. As the manager of an area, it is important you consciously decide when to take short term action and when this would be inappropriate.

If you decide to take the short term approach, then it is a good idea to:

- Make a definite time to look at it more thoroughly later on and to decide who to involve in further problem solving.
- Inform staff and management it is a short term solution which will be dealt with more thoroughly at a specified time.
- Cost the implications of tackling the problem this way.

Most likely a symptom of a long-term problem can be accurately termed an immediate crisis or a short-term problem. In many cases, a supervisor must put out a fire, resolving the short term crisis before (s) he can tackle the cause.

Example

Let's say you're a supervisor who is in charge of staffing a convenience store. You receive an early morning call from the person who is supposed to open the store, telling you that she can't make it to work because she's sick. It's only five minutes until the store is supposed to open and you live 40 minutes away. The employee has called in sick many times this month. You don't believe her any more.

The immediate crisis is your **short-term problem. Specifically, it's time for the store to open, there is no staff on-site and you're too far away to cover.** This problem needs immediate attention. In minutes, you start the call list and find an employee who will open the store. The doors should be open for business in 20 minutes.

You've resolved the immediate crisis, but the long-term problem still exists. The facts show that your employee has already called in sick five times this month, with three of the five times on Mondays. Every time was for the early morning opening shift. You've noticed that the employee is never sick during the afternoon or evening shifts. In fact, she has been one of your most competent and reliable employees.

The problem is escalating, with today's call only minutes before the store was to open. At least in the past she'd given you an hour to find a replacement, who was often yourself. You know that this issue with this employee must be resolved, or else you'll be likely to receive another early-morning phone call or worse yet, no call, and the store would go unopened for a couple of hours. Specifically, **the long-term problem is that you have a normally reliable employee who is proving to be unreliable when scheduled for an opening shift and you don't know the reasons for this change in behavior.**

Too many supervisors spend far too much time putting out fires and never resolving the situation that's causing them. Some fill their days dealing with crisis after crisis, gaining a false sense of productivity. An excellent supervisor deals with the immediate problem but also asks, "Why did that happen?" Only then can the cause be accurately identified and a more permanent resolution applied.

Self-Check -2	Written Test

Direction I: Multiple choice item

Instruction: Choose the best answer for the following questions and write the letter of your answer on the answer sheet provided in the spaces provided. Use bold letter (2 pts each).

1. Taking short term action at workplace is useful:
   A. To provide the necessary or expected services to the customer.
   B. To meet OHS requirements.
   C. To deal with a complaint.
   D. To get staff working together again. E. All
2. _____is used to solve a problem until it can be looked at more closely and the problem dealt with more thoroughly.
   A. Long term action C. Intermediate action
   B. Management decision D. Short term action
3. Disadvantage of taking short term action to solve problems arising at a work place is:
   A. A stop-gap measures are not satisfactory in the long term as they are often more costly and they do not prevent the problem from recurring
   B. Do not allow staff working together again after the problem
   C. Do not give you time to analyse and work through the problem at a later date.
   D. Do not provide the necessary or expected services to the customer.

Note: Satisfactory rating – 2 and above pts Unsatisfactory - below 6 pts

Answer Sheet-1

Name: _____ Date: _____

Multiple Choice Questions

1 _____
2 _____
3 _____

Score = _____

Rating: _____

Information Sheet-3	Analysing Problems for Long Term Impact and Assess Potential Solutions

3.1. Introduction

Workplace problems may have long term impact on organizations. If these problems are not analysed and potential solution were not be assessed on time, they will decrease the efficiency and effectiveness of the organization.

3.2. Need for long term action

Employers expect managers to analyse problems for any long-term impact so appropriate solutions can be devised. Involvement of staff and other managers in the consideration is regarded as optimizing the effectiveness of solutions generated. Whilst short term action is useful, or essential, for getting through the day-to-day activities of an organisation, managers must take also responsibility for long term planning especially where there are regular repeated instances of emergencies or situations cropping up.

In the majority of cases it will become obvious, because:

- The situation is causing problems for staff and for customers.
- Staff or customers are becoming annoyed or upset by it.
- It is adversely affecting staff performance and customer service levels.
- It is costing the company money
- It is involving and negatively impacting on a lot of people.
- It is presenting an obvious risk of some sort.
- It is breaching legislation, company policies and organisational values.

The key is to first identify the problems which warrant or merit long term consideration. To do this, draw up an all inclusive list which includes every single thing that you realistically expect to be a problem. Then arrange a time to meet with senior management to discuss it. Seek their advice and be guided by them.

3.3. Suggestions for long term action

Having identified the problems worthy of long term planning attention, consider the following points as they are all common to most problem solving models around:

- Identify the problem and describe the nature of it in the most all-encompassing terms possible. You really have to understand the full extent of the problem to have any chance of its successful resolution. The more information the better.
- Identify the cause of the problem. Often, identifying the cause is a major part of solving the problem, but not always. There can be more than one cause.
- Check, verify and test that what you believed to the cause is actually the cause. Don't be afraid to go back to the drawing board. Never expect to solve this thing at the first go.
- Describe and classify the people who are affected by the problem. Is the problem actually going to cause the widespread damage you initially expected or is it a relatively small fallout problem?
- Nominate the nature and result of the adverse effects on the people listed above.
- Determine the amount of time that the problem will occur for.
- Analyse all legal implications pertaining to the problem.
- Determine the costs involved in the problem – at this stage consider the costs of doing nothing compared to taking some form of action.
- Integrate the loss from the problem into the overall operation, profitability and viability of the operation.
- List all possible solutions.

When a set of possible of solutions have been established, they need to be investigated for action. Those involved will depend on the problem but may include customers, other managers, owners, suppliers, partners, staff and officials from various government authorities. The critical point at this stage is to think through all the possible long term impacts of the solution and to attach figures to these responses.

In many cases, there will be a requirement to make a recommendation, that is, to pick one of the alternatives and promote it. This requires you as the manager to explain why the other options aren't viable, and why the one you have selected is indeed the best choice. Where the problem concerned does not require you to rush in to a decision, the best advice is to spend time doing your research and discovering everything possible about the issue.

It is also a wise plan to try to get other senior people to agree with your intention before making it a recommendation. Even better if a committee comes to the decision.

What type of workplace conflict requires intervention?

Anything that disrupts the office, impacts on productivity or poses a threat to other employees needs addressing. The degree to which you tolerate a situation before intervention may vary. A manager may not feel it necessary to intervene when a minor exchange of words occurs between employees--unless such an incident becomes a daily occurrence and expands beyond the employees initially involved. However, a situation where one employee threatens another requires immediate action. When handling conflict, some basic guidelines apply.

Self-Check -3	Written Test

Direction I: Multiple choice item

Instruction: Choose the best answer for the following questions and write the letter of your answer on the answer sheet provided in the spaces provided. Use bold letter (2 pts each).

1. Problems causing long term impact include all, ***but not:***
   A. A one-off event situation
   B. A problem breaching legislation, company policies and organisational values.
   C. a situation involving and negatively impacting on a lot of people.
   D. The situation is causing problems for staff and for customers.
2. The first step in assessing potential solution to workplace problems causing long-term impact is:
   A. List all possible solutions.
   B. Identifying the problem
   C. Analyse all legal implications pertaining to the problem.
   D. Determine the costs involved in the problem

Note: Satisfactory rating – 4 and above pts ***Unsatisfactory - below 4 pts***

Answer Sheet-1

Name: _____ Date: _____

Multiple Choice Questions

1 _____
2 _____
3 _____

Score = _____

Rating: _____

Information Sheet-4	Encouraging Team Members to Participate in the Processes of Problem Solving

4.1. Introduction

While managers should encourage and motivate staff to solve their own problems and take responsibility for implementing them, there will always be times when they come to you with a problem. An effective response to these situations is to continue the theme of involvement and actively engage staff in helping to identify a solution.

4.2. Dealing with problems raised by a team member

Throughout your working week, problems brought to you by staff will cover a range of issues. They may relate to : Operational matters (*Example:* “The drainage systems are blocked and I'm too busy to deal with it”); *Customer service difficulties:*(*Example:* “That operator is drunk and I'm having problems dealing with him”) and Staffing matters (*Example:* “I seem to be doing most of the work whilst other staff just aren't pulling their weight”).

One way to deal with problems raised by a team member is to make a decision and solve the problem yourself. This is often necessary if:

- The problem involves calling in others staff
- Things are flat out and you need to make a decision to keep things moving
- Staff do not have the authority or the ability to solve it themselves
- Where the matter involves matters of confidentiality, security or health and safety.

However, where possible it is advisable to get the staff member involved in solving the problem themselves, with your support.

Techniques to facilitate this include:

- Asking them to fully describe the details of the situation
- Asking them what they have already done to try to resolve the situation
- Asking them why they believe their actions to-date have not been successful
- Asking them what they think the next step should be and why that is the case
- Contributing ideas to extend and support their ideas and suggestions
- Encouraging them to think of more alternatives

- Providing your thoughts on resolving the situation including the reasons why you believe your ideas might work.
- Encouraging them to implement an identified possible solution.

The key to this approach is to build their ability to make better decisions and to gain the confidence and experience to make those decisions. This approach is very crucial in developing people sense of leadership. In addition, it is useful to have accepted solution to the problem, since they are involved in problem identification and decision making processes.

Self-Check -4	Written Test

Direction I: Multiple choice item

Instruction: Choose the best answer for the following questions and write the letter of your answer on the answer sheet provided in the spaces provided. Use bold letter (2 pts each).

1. How do you get the staff member involved in solving the problem themselves, with your support?
   A. By asking them to fully describe the details of the situation
   B. By asking them what they have already done to try to resolve the situation
   C. By asking them why they believe their actions to date have not been successful
   D. By encouraging them to implement an identified possible solution.
   E. All
2. Example of problem raised by team member related to operational matter may be:
   A. The drainage channel is blocked and it is beyond my capacity to solve the problem
   B. That operator is drunk and I'm having problems dealing with him
   C. I seem to be doing most of the work whilst other staff just aren't pulling their weight
   D. Why other stuffs perform this job?

Note: Satisfactory rating – 4 and above pts ***Unsatisfactory - below 4 pts***

Answer Sheet-1

Name: _____ Date: _____

Multiple Choice Questions

1 _____
2 _____
3 _____

Score = _____

Rating: _____

Information Sheet-5	Taking follow up action to monitor the effectiveness of solutions in the workplace

5.1. Introduction

Whatever solutions are arrived at, whatever resolutions are made in the workplace, it is essential to track the progress of those decisions to monitor their outcome and their effectiveness.

While it is expected decisions and actions will fix problems the reality is this is not always the case and managers are expected to follow-up to ensure the workplace operates as effectively and efficiently as possible.

5.2. Timing

Usually a time for monitoring or reviewing progress is made at the same time the decision is taken. This time and date is diarized electronic or paper-based diary with a meeting sometimes held with relevant stakeholders. This meeting simply seeks to determine whether or not the recommended action has been implemented is working as anticipated.

The meeting should not be seen as a witch hunt, or as an opportunity to start laying the blame at anyone's feet if things are not progressing smoothly. The intent is simply to verify things are on track, or to identify if and where they are not. Where things are not proceeding as planned, this session is doing its job. It is highlighting something needs more attention.

Managers should note the need for follow up action can be delegated to someone else. Where the review shows things are on track, and proceeding as expected, you may well decide to feed this positive information back to those who helped make the decision. It is always useful to be able to pass on some good news wherever possible.

Where a further or on-going problem is identified, those concerned must likewise be informed so they too can learn from the experience and so they may re-group in order to come up with another solution.

Often the best person for the job can be the one who has made the most mistakes. As the old saying goes ***"the person who never made a mistake, never made anything".***

Self-Check -5	Written Test

Direction I: Multiple choice item

Instruction: Choose the best answer for the following questions and write the letter of your answer on the answer sheet provided in the spaces provided. Use bold letter (2 pts each).

1. A time for monitoring or reviewing progress is made at:
   A. The same time the decision is taken
   B. Prior to the decision
   C. Week latter
   D. Any time in the future
2. Which of the following is ***not*** true?
   A. Decisions and actions will fix workplace problems only by themselves
   B. Managers are expected to follow-up to ensure the workplace operates as effectively and efficiently as possible.
   C. The person who never made a mistake, never made anything
   D. It is essential to track the progress of those decisions to monitor their outcome and their effectiveness.

Note: Satisfactory rating – 4 and above pts ***Unsatisfactory - below 4 pts***

Answer Sheet-1

Name: _____ Date: _____

Multiple Choice Questions

1 _____
2 _____
3 _____

Score = _____

Rating: _____

Operation Sheet -1	**Procedures of Solving Workplace Problems and Making Decision**

The following six steps are used to solving workplace problems and making decisions.

Step 1: Identify the problem.

Step 2: Search for alternatives.

Step 3: Weigh the alternatives.

Step 4: Make a choice.

Step 5: Implement the choice.

Step 6: Evaluate the results and, if necessary, start the process again

Operation Sheet -2	**Techniques of encouraging team members to participate in the processes of problem solving at the workplace**

These seven steps are used for an effective problem solving process by encouraging team members to participate in the processes .

Step 1: Let the team member identify and report the issue/problem

Step 1: Understand his/her interests and digest the issue together

Step 1: List the possible solutions (options)

Step 1: Evaluate the options with the team member

Step 1: Select an option or options to solve the problem with the team member

Step 1: Document the agreement(s)

Step 1: Agree on contingencies, monitoring, and evaluation with the member

LAP Test 1	Practical Demonstration

Name: _____ **Date:** _____

Time started: _____ **Time finished:** _____

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

Task 1: Solve workplace problems and make decision

Task 2: Encourage team members to participate in problem solving processes

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