



NQF Level: 2

US No: 116077

Facilitator Guide

Primary Agriculture

Monitor Water Quality



Facilitator:

Company:

Commodity: Date:

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agriculture

Department:
Agriculture
REPUBLIC OF SOUTH AFRICA



Before you get started...

Dear Facilitator,

This Facilitator Guide (together with the relevant Learner Guide) is aimed at facilitators who will be assisting learners wishing to complete the following unit standard:

Title: Monitor water quality	US No: 116077	NQF Level: 2	Credits: 3
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This guide contains all necessary facilitation instructions to ensure that learners will attain the expected competencies required by the above-mentioned unit standard. This guide is designed to be used during the presentation of a learning session based on this unit standard. The full unit standard is attached at the end of this guide as well as at the end of the relevant Learner Guide. Learners are advised to read the unit standard at their time. Please discuss the unit standard with the learners to ensure that they understand what is expected from them to achieve the outcomes of the unit standard.

This unit standard is one of the building blocks in the qualifications listed below. Please mark the qualification you are currently facilitating, because that will be determined by the context of application:

Title	ID Number	NQF Level	Credits	Mark
National Certificate in Animal Production	48976	2	120	<input type="checkbox"/>
National Certificate in Mixed Farming Systems	48977	2	120	<input type="checkbox"/>
National Certificate in Plant Production	48975	2	120	<input type="checkbox"/>

Please mark the learning program the learners are enrolled in:

Are you enrolled in a:	Y	N
Learnership?	<input type="checkbox"/>	<input type="checkbox"/>
Skills Program?	<input type="checkbox"/>	<input type="checkbox"/>
Short Course?	<input type="checkbox"/>	<input type="checkbox"/>

Note to Facilitator:
If you are presenting this module as part of a full qualification or learnership, please ensure that you have familiarised yourself with the content of the qualification.

Please explain the above concepts to the learner.

There are three guides, namely the Learner Guide, the Assessor Guide and the Facilitator Guide. These guides have been developed to address specific aspects of the learning experience. You therefore need to use these guides complementally to one another.

Make this an enjoyable learning experience!

Context of Application ...

Primary Agriculture is a diverse sector and a wide range of commodities is being produced for both national and international market. Each commodity has its own production requirements and practices. You will be facilitating the learning process within a specific context where a specific agricultural commodity is being produced. The learning material has been written in a **generic** manner, as it is aimed to be available on national level and should be relevant to be applied within a variety of commodities. It is therefore inclusive of all agricultural commodities and crop in this field. Therefore, the examples that are being used in the materials may not always be applicable to your specific community, commodity, environment or region.

This presents you, the facilitator, with the challenge to **contextualise** the learning material. It is imperative that you, the Facilitator and Assessor interpret and present activities, case studies and projects related to the material in such a way that learners can easily identify and apply their knowledge within their own context. This will require from you to add examples of crop, which are applicable to the community or farm. Learners must be guided with examples from their own communities, commodities, environment or regions. This should be done by complementing the learning material with:

- Examples relevant to the commodity,
- Including commodity specific requirements,
- Including operating procedures of the farm,
- Including agricultural practice specific requirements,
- Agricultural markets,
- Guiding learners to write these specifics down in the learning guide, etc.

The contextualisation of the learning material is a very important step in preparing for and facilitating the learning experience and enough time and effort should be put into this exercise.

According to the qualifications mentioned on page 2, this module could be contextualised to fit the following groups of commodities:

Plant Production	Animal Production	
<ul style="list-style-type: none"> • Organic production, • Hydroponic production, • Perma-culture production, • Agronomy, • Horticulture, • Natural resources harvesting. 	<ul style="list-style-type: none"> • Small stock production, • Large stock production, • Dairy production, • Pig production, • Poultry production, • Game, • Aqua / mari culture, • Commercial insects • Animal fibres harvesting, • Bee keeping, 	<ul style="list-style-type: none"> • Natural resources harvesting, • Organic production, • Perma-culture production, • Eco/Agri Tourism, • Agro Chemicals, • Horse Breeding, • Etc.

How to use this guide ...

Throughout the guide information is given specifically aimed at you, the facilitator, to **assist** in the actual presentation of the learning material and/or facilitation of the learning process. Although this guide contains all the information required for attaining competency in this unit standard, references to additional resources, both printed and electronic, are provided for additional reference by the facilitator and further study by the learner.

Please note that the purpose of this information is merely to **guide** you, the facilitator, and is provided as a suggestion of possibilities. It remains the responsibility of every facilitator to re-assess the learner/s in each learning situation throughout the learning process in order to stay in touch with their specific learning needs. This should be the determining factor in the choice of the learning approach to follow.

Use the different boxes listed below for identification purposes:



Instructions regarding **activities**, whether group or individual activities will be described in this box.



Facilitators' Tip ...

My Notes ...

You can use this box for your own notes/comments.

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What & How will you be Facilitating?

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The Learning Experience...

When learners have achieved this unit standard, they will –

- ◆ Demonstrate an understanding of the importance of water quality to agriculture and to monitor and maintain water quality using established procedures. In addition they will be well positioned to extend their learning and practice into other areas of agriculture and water management.
- ◆ Gain an understanding of sustainable agricultural practices as applied in the animal-, plant and mixed farming sub fields. The application of maintaining water quality practices in primary agriculture is focused on in this unit standard.
- ◆ Be able to participate in, undertake and plan farming practices with knowledge of their environment. A culture of maintenance and care will be instilled for both the environment as well as towards farming infrastructure and operations by this unit standard.

Learners will specifically be able to:

- ◆ Demonstrate an understanding of water quality management.
- ◆ Demonstrate an understanding of the importance of water quality to agriculture.
- ◆ Demonstrate an ability to monitor and perform basic water quality tests and analyses.
- ◆ Demonstrate an ability to perform and understand maintenance tasks on certain operational technical systems related to water quality.

Learners will also gain a basic knowledge and understanding of:

- ◆ The names and functions of water quality maintenance systems and components.
- ◆ The names and attributes of water quality factors.
- ◆ Sensory cues related to water quality.
- ◆ The purpose of understanding the need for water quality knowledge.
- ◆ Procedures related to the maintenance and testing of water quality.
- ◆ Rules and regulations related to water.
- ◆ Basic report writing skills.

Learning Assumed to be in Place:

- ◆ It is assumed that a learner attempting this unit standard will show competence against the following unit standards or equivalent:
- ◆ NQF1: Maintain basic water quality.



Remember to do a diagnostic assessment of the learner's prior learning and ensure that they are starting at the correct level.



Facilitators' Tip ...

It is important to ensure that the learners who are undertaking this learning program has already completed the correct prior learning modules, to ensure that they are not unfairly disadvantaged by the learning process, and can be supported accordingly.

Do not forget to complete the Diagnostic Assessment (Step 3 in the Assessment Guide).

Tips for level of learning



Remember the following before you get started:

Typically, a learning programme leading to the award of a qualification or unit standards at this level should develop learners who demonstrate an ability to:-

- Work and learn in a disciplined manner in a well-structured and supervised environment.
- Manage their time effectively.
- Develop sound working relationships and an ability to work effectively as part of a group.
- Express an opinion on given information clearly in spoken and written form.
- Collect, organise and report information clearly and accurately.
- Use their knowledge to select and apply known solutions to well-defined routine problems.
- Use a variety of common tools and instruments; apply literacy and numeracy skills to a range of different but familiar contexts.
- Understand the environment within which he/she operates in a wider context.
- Gain knowledge of one or more areas or fields of study, in addition to the

Learning Program Time Frames

	Total time allocated (hours)	Theoretical learning time allocated (hours)	Practical learning time allocated (hours)	Activities to be completed
Complete Program (including summative assessment)	30 hours	16 hours 45 minutes	13 hours 15 minutes activities	9
Learner Orientation and "Ice Breaker"	30 minutes	15 minutes	15 minutes	N/A
Purpose, Introduction and Learner Directions	30 minutes	15 minutes	15 minutes	N/A
Introduction to Crop Production	45 minutes	30 minutes	15 minutes	N/A
Session 1	4 hours 15 minutes	2 hours 30 minutes	1 hour 45 minutes activities	1 – 2
Session 2	6 hours 15 minutes	3 hours 15 minutes	3 hours activities	3 – 4
Session 3	6 hours 15 minutes	3 hours	3 hours 15 minutes activities	5 – 7
Session 4	7 hours 30 minutes	4 hours 30 minutes	3 hour activities	8 – 9
Preparation for Assessment & revision	4 hours	2 hours 30 minutes	1 hour 30 minutes	N/A



Facilitators' Tip ...

This checklist has been designed to assist you in delivering the best possible facilitation to the learners. Please use it and supply whatever resources you might have in short supply at your venue of learning.

Facilitator's Checklist & Training Aids

Learner support strategies:
<p>Learners are supplied with all resources and aids as required by the programme – including:</p> <ul style="list-style-type: none"> ▪ Objects & devices such as equipment, protective clothing, safety gear, etc. ▪ Learner Guides including the relevant unit standard ▪ Visual aids, etc.

Use this checklist below during your preparation to ensure that you have all the equipment, documents and training aids for a successful session.

Preparation:	Yes	No
Qualification Knowledge – I have familiarised myself with the content of the applicable qualification		
Unit Standard Knowledge – I have familiarised myself with the content of all aspects of the applicable unit standard		
Content Knowledge – I have sufficient knowledge of the content to enable me to facilitate with ease		
Application knowledge – I understand the programme matrix & have prepared for programme delivery accordingly		
Contextualisation – I have included information which is specific to the commodity and practices related to the commodity		
Ability to respond to learners background & experience – I have studied the learner demographics, age group, experience & circumstances & prepared for programme delivery accordingly		
Enthusiasm & Commitment – I am passionate about my subject & have prepared my programme delivery to create a motivating environment with real commitment to success		
Enterprise knowledge – I know & understand the values, ethics, vision & mission of the workplace & have prepared my programme delivery, reporting & administrative tasks accordingly.		
Equipment check:		
Learner guides x 1 per learner		
Assessment guides x 1 per learner		
Writing materials & stationary (facilitator & learner)		

Preparation:	Yes	No
White board & pens		
Flip chart paper		
Proxima projector & screen		
Laptop & programme disk		
Sample Hand-outs and examples of laws and other relevant documents		
Safety gear as prescribed by unit standard and applicable legislation		
Documentation checklist:		
Attendance Register		
Course Evaluation		
Learner Course Evaluation		
Portfolios of evidence		

Contextualisation of Content!

Go through this module and indicate what specific **information / activities / examples** should be included in this module?

Contextualisation	
<ul style="list-style-type: none"> ▪ Commodity specific? 	
<ul style="list-style-type: none"> ▪ Operating procedures of the farm? 	
<ul style="list-style-type: none"> ▪ Agricultural practices? 	
<ul style="list-style-type: none"> ▪ Agricultural markets? 	

Water Quality – an Introduction



Facilitators' Tip ...

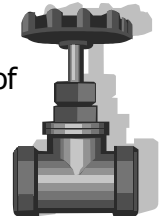
While this section does not form part of the unit standard as such, it is essential for the learner's orientation to the learning context. Please take time to ensure that the learners have a thorough understanding of this section.

In its purest form, water contains only water molecules with the chemical formula of H₂O, meaning each molecule consists of two hydrogen (H) atoms and one oxygen (O) atom. Water is however an excellent medium for many other materials, such as salts, to dissolve in. Water is also host to a variety of organisms, and furthermore often carries insoluble and suspended material.

All agricultural plants and animals require water to be relatively free of pollution; otherwise they will suffer greatly from poor health. The farmer should be able to recognise signs of poor water quality in a water supply. By doing this the farmer can pro-actively manage for the health and well being of the farm.



By maintaining the water delivery infrastructure such as pumps, pipes, dams and boreholes, you are better able to maintain and monitor a consistent level of water quality and quantity.



Session

1 Understanding water quality management

**Learner
Guide:
Page 8**

After completing this session, the learner should be able to:
SO 1: Demonstrate an understanding of water quality management.

Concept (SO 1)	Time frame	Activities related to the concept
An understanding is demonstrated of the effects of certain physical quality factors, and it is related to a relevant agricultural product species.	4 hours 15 minutes	Activity 1 – 2
A basic understanding of the effects of certain chemical quality factors is demonstrated and it is related to a relevant agricultural product species.		
Physical and chemical knowledge regarding water quality attributes is demonstrated.		



Facilitators' Tip ...

- Show as many examples as possible of different type of irrigation systems and their emitters as an introduction and revise their different applications.
- Lead a class discussion on the importance of water quality for irrigation and use the opportunity to establish what learners are already comfortable with and have knowledge of.



Please allow learners to complete Activity 1 in their Learner Guides

Type of activity	Resources
1. Class discussion and brainstorming	
Instructions to give to the learners	
Allow a class discussion and have learners note what they learn during the discussion regarding water quality management, why it is required and basic ideas of how to do it. Allow this to be a brainstorming session prior to actually facilitating on these subjects.	



Please allow learners to complete Activity 2 in their Learner Guides

Type of activity	Resources
2. Individual Exercise: Please complete the worksheet	
Instructions to give to the learners	
After discussing chemical and physical water quality factors, allow learners to complete the worksheet individually.	
Conclusions	



Facilitators' Tip ...

Spend time explaining the different water quality factors and ensure that learners can distinguish between physical and chemical water quality factors.

Spend additional time explaining the concept of pH. Learners might struggle with the idea of pH measurement. An easy way to facilitate this is to let learners taste water and lemon juice and vinegar and detect acidity as a "human pH meter". Use a simple pH test, such as litmus paper, to then measure the pH of the substances that they tasted.



Facilitators' Tip ...

Summary

This is an opportunity to check the progress that learners have made.

Allow time for the learners to read through the summary and to gauge their own progress. Make sure that each and every learner gets an opportunity to ask questions.

Session

2 Why is water important in agriculture?

Learner Guide:
Page 15

After completing this session, the learner should be able to:

SO 2: Demonstrate an understanding of the importance of water quality to agriculture.

Concept (SO 2)	Time frame	Activities related to the concept
The importance of water quality on plants and animals in agriculture is demonstrated.	6 hours 15 minutes	Activity 3 – 4
An understanding of processes implemented to improve water quality is demonstrated.		
The ability to sample and monitor water quality factors are demonstrated.		



Facilitators' Tip ...

This is a good opportunity to allow a discussion session about what the learners have learnt so far regarding water quality. Encourage learners to participate in the discussion, to share their knowledge and experience with each other and, to ask questions about things that they are uncertain of.

Explain the concept of half-life and it's important in water quality thoroughly. Ensure that learners understand that water is an important solvent for many agro-chemicals and that water quality affects the effectiveness of agro-chemicals.



Facilitators' Tip ...

Most learners will only be familiar with filtration. Spend time in explaining the other improvement methods and all the terminology that goes with water quality. Be alert for learners losing interest. Give frequent breaks and introduce energisers or icebreakers during this session.



Please allow learners to complete Activity 3 in their Learner Guide

Type of activity	Resources
3. Experiment: Using a Pilot Plant	
Instructions to give to the learners	
Supply learners with all relevant equipment to perform the experiments. Note the correct use and preparation of the equipment. Note adherence to general Health and Safety. Note the accuracy of measurement and recording of values.	



Please allow learners to complete Activity 4 in their Learner Guides

Type of activity	Resources
4. In pairs: Discuss the questions and write down your answers.	
Instructions to give to the learners	
Allow time for learners to answer the worksheet after discussion about the effects of water quality management on their crop.	



Facilitators' Tip ...

Alert learners to the dangers of adjusting pH with acids. Ensure that they are aware that a very small amount of acid can have a dramatic impact on the pH of water. Also ensure that learners are aware of the health and safety regulations with regard to working with dangerous chemical substances.



Facilitators' Tip ...

Some learners may be aware of fertigation, although the technical term may be unfamiliar. Mention that it is discussed in more detail in plant nutrition and irrigation learning material. Establish what the learners know and what colloquial terminology is.

This is often not considered or included in water quality improvement strategies. Approach it from a social responsibility perspective and bring the concept of water as a scarce resource and the need for recycling of water into this discussion.

Learners may struggle with the idea of water conducting electricity. Explain it through "why we keep water and electricity apart".

Explain the role of sampling in determining water quality and, if possible, perform actual water sampling with the learners at different water sources.



Facilitators' Tip ...

Summary

This is an opportunity to check the progress that learners have made.

Allow time for the learners to read through the summary and to gauge their own progress. Make sure that each and every learner gets and opportunity to ask questions.

Session

3 Monitor and perform basic water quality tests and analyses

**Learner
Guide:
Page 24**

After completing this session, the learner should be able to:

SO 3: Demonstrate an ability to monitor and perform basic water quality tests and analyses.

Concept (SO 3)	Time frame	Activities related to the concept
The ability to monitor and sample water sources is demonstrated and it is prepared for analysis.	6 hours 15 minutes	Activity 5 – 7
The ability to perform simple water quality tests to determine water quality is demonstrated.		
The ability to report meaningfully on water quality tests is demonstrated.		



Facilitators' Tip ...

Spend time on the preparation of samples and emphasise that incorrect procedures will lead to incorrect analyses and data and inaccurate result.



Facilitators' Tip ...

Sampling procedures are best explained in practice. Arrange for learners to observe sampling and practice doing it themselves.



Please allow learners to complete Activity 5 in their Learner Guides

Type of activity	Resources
5. Demonstration	Supply each pair with water sampling equipment and sample bottles as well as access to a water source or a simulation of a water source.
Instructions to give to the learners	
<p>Discuss with the learners the information provided in the learner guide about:</p> <ul style="list-style-type: none"> • Types of samples. • Equipment used to take the samples. • Substance – identifying what exactly you are looking for when taking water samples. • Identify the possible sources for the taking of water samples. • Ways of processing the data. <p>Brief the learners on the activity involving taking water samples at the place of work. This will be conducted at the same time over a two day period involving easy to use water sampling equipment. They must record their findings on the provided table and going back to information they got on data collection in module four they can report meaningfully to management.</p>	



Please allow learners to complete Activity 6 in their Learner Guides

Type of activity	Resources
6. Job description	
Instructions to give to the learners	
<p>Explain to learners what a job description might look like, preferably with a real example from the farm where practical learning is taking place.</p> <p>The emphasis of this activity is in the instructions given and the logic of the instructions and not in the technical correctness of the job description.</p> <p>Adapt the answer to the person the learners targeted in the job description and note the correct instructions to take water samples.</p>	



Please allow learners to complete Activity 7 in their Learner Guides

Type of activity	Resources
7. Experiment: Water Tests	Arrange for equipment to be available to perform the tests and let learners practice and perform the tests.
Instructions to give to the learners	



Facilitators' Tip ...

If possible, demonstrate these tests or arrange for learners to observe someone performing these tests.



Facilitators' Tip ...

Summary

This is an opportunity to check the progress that learners have made.

Allow time for the learners to read through the summary and to gauge their own progress. Make sure that each and every learner gets and opportunity to ask questions.

My Notes ...

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4 Perform maintenance tasks on certain systems related to water quality

Session

**Learner Guide:
Page 33**

After completing this session, the learner should be able to:

SO 4: Demonstrate an ability to perform and understand maintenance tasks on certain operational technical systems related to water quality.

Concept (SO 4)	Time frame	Activities related to the concept
The ability to perform maintenance on water quality control systems is demonstrated.	7 hours 30 minutes	Activity 8 – 9
The ability to manage chemical and physical requisites related to water quality control systems is demonstrated.		
The ability to report meaningfully on water quality systems` maintenance is demonstrated.		



Facilitators' Tip ...

This is an important section, and a lot of information has to be relayed and a lot of technical terms and abbreviations have to be covered. Give frequent breaks, introduce games and energisers, and create an environment where learners participate and give feedback on a constant basis. Demonstrate as many as possible of the concepts and techniques in the workplace.



Facilitators' Tip ...

Summary

This is an opportunity to check the progress that learners have made.

Allow time for the learners to read through the summary and to gauge their own progress. Make sure that each and every learner gets and opportunity to ask questions.



Please allow learners to complete Activity 8 in their Learner Guides

Type of activity	Resources
8. Class discussion	
Instructions to give to the learners	
<p>Lead a class discussion and have learners make notes regarding their findings.</p> <p>Discuss the information with the learners concerning the tables for the treatment of different substances. This is broken into the chemical and physical quality elements of water.</p> <p>Briefly look at what chemicals can be added to achieve the desired out come.</p> <p>Briefly look at ways they can physically improve the quality of water by aeration and allowing the water to stand so thee sediment separates to the bottom of the tank.</p>	



Please allow learners to complete Activity 9 in their Learner Guides

Type of activity	Resources
<p>9. Write a report</p>	<p>It is vital that the learners are exposed to an operational water quality system.</p> <p>Provide an opportunity for learners to observe a functional water quality system in operation. If a farm does not exist in the immediate vicinity that the learners can go to, then approach the local municipality and observe their water quality system.</p> <p>Brief the learners on what would be expected from them in the maintenance of a water quality system and the reporting procedure for anything that was out of order.</p>
<p align="center">Instructions to give to the learners</p>	
<p>Explain the general requirements that learners have to meet when writing a report.</p> <p>Allow learners time to write a report regarding the maintenance performed on water quality systems and note relevance to their specific farms..</p>	

My Notes ...

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What will I do differently next time?

Take some time to **reflect** on your own activities as facilitator of this Unit Standard. Then write down five of the most important lessons you have learnt and include a motivation:

What will I do differently next time?	Motivate how or why (Give examples, reasons, etc.)
1.	
2.	
3.	
4.	
5.	

As facilitator, you have hands on experience in the application of the unit standard. And you might experience difficulties with the unit standard that the developers did not anticipate. Also, the unit standard will be revised at the end of the registration period. Your comments below can be an important contribution in the revision process and should be brought to the attention of either the AgriSETA ETQA manager or the SGB chairperson.

Please take some time to reflect on your experience and list a few of the difficulties you had to address.

Difficulties I had with the Unit Standard	Recommended Changes to Address the Difficulty
6.	
7.	
8.	
9.	
10.	