NQF Level: 3 **US No: 116212**

Facilitator Guide

Primary Agriculture

Maintain Water Quality Parameters

Facilitator: . . . . . .

Company: . . . . . .

Commodity: . . . . . Date: . . . . . .

The availability of this product is due to the financial support of the National Department of Agriculture and the AgriSETA.

agriculture
Department:
Agriculture
REPUBLIC OF SOUTH AFRICA

AgriSETA

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:	Maintain Water Quality Parameters				
US No:	**116212**	**NQF Level:**	3	**Credits:**	2

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	49048	3	120	❒
National Certificate in Plant Production	49052	3	120	❒

Please mark the learning program the learners are enrolled in:

Are you enrolled in a:	Y	N
Learnership?	❒	❒
Skills Program?	❒	❒
Short Course?	❒	❒

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	
• Organic production, • Hydroponic production, • Perma-culture production, • Agronomy, • Horticulture, • Natural resources harvesting.	• Small stock production, • Large stock production, • Dairy production, • Pig production, • Poultry production, • Game, • Aqua / mari culture, • Commercial insects • Animal fibres harvesting, • Bee keeping,	• 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?

The Learning Experience...

On completion of this module, the learners will be able to:

- Maintain water quality and adjust systems to ensure appropriate water quality.

Learners will specifically be able to:

- Read, record and interpret certain parameters and abnormalities in water quality
- Understand the critical control points in water quality management
- Decide what corrective action should be taken on certain operational or technical issues that control specific physical and chemical factors in water and relate it to a specific organism's water quality requirements
- Ensure that quality assurance systems related to water quality are in place and maintained

Learners will also gain basic knowledge of:

- Names and functions of all the various components of water supply and quality systems.
- Attributes of water related to water quality.
- The requirements of organisms related to their water need.
- The purposes of maintaining relevant water quality for living organisms.
- Measurement and recording technique.
- Water purification techniques and systems.
- Relevant legislation related to the feeding and care of living organisms.
- Relevant legislation related to water use and environmental issues.
- Interpersonal skills related to communication.
- Sensory and documented cues related to water quality.
- Sensory cues related to the water requirements and use of water by living organisms.

Learning Assumed to be in Place:

- NQF 2, 116077, Monitor water quality
- NQF 2, 116070, Operate and support a food safety and quality management system in the agricultural supply chain
- NQF 2, 116121, Apply sustainable farming practices to conserve the ecological environment

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

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)	20 hours	6 hours 45 minutes	13 hours 15 minutes	n/a
Learner Orientation and "Ice Breaker"	30 minutes	0	30 minutes	Ice breaker
Purpose, Introduction and Learner Directions	30 minutes	30 minutes	0	0
Session 1	4 hours	1 hour 30 minutes	2 hours 30 minutes	1
Session 2	4 hours	1 hour	3 hours	2
Session 3	4 hours	1 hour	3 hours	3
Session 4:	3 hours 30 minutes	1 hour	2 hours 30 minutes	4
Preparation for Assessment & revision	3 hours	1 hour 30minutes	1 hour 30minutes	As per assessment
Assessment per learner	30 minutes	15 minutes	15 minutes	As per assessment

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 fundamental areas of study.

Facilitator's Checklist & Training Aids

Learner support strategies:
Learners are supplied with all resources and aids as required by the programme – including: ▪ Objects & devices such as equipment, protective clothing, safety gear, etc. ▪ Learner Guides and Learner Guide ▪ 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)		
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		

My Notes ...

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Contextualisation of Content!

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

Contextualisation	
▪ Commodity specific?	
▪ Operating procedures of the farm?	
▪ Agricultural practices?	
▪ Agricultural markets?	

Water Quality – an Introduction

Understanding Water Quality Management

- Irrigation is used in crop production to supply plants with the water they need in addition to rainfall.
- Water quality factors that are important depend on the type of irrigation system used. Micro-sprayer irrigation is the most commonly used in South Africa to irrigate permanent crops and drip irrigation the second most common.
- Water dissolves many substances, such as salts, and is a carrier for a lot of suspended material, which influences the water quality, and which is why it is polluted to easily.
- Water quality management (WQM) has to do with managing foreign material in the water, and not with the water itself.
- Water quality management concerns six critical control points, being:
  - Determining the quality of the water received on the farm;
  - Identifying the causes of the said quality;
  - Being aware of the quality standards of water for crop production;
  - Improving the quality of received water where possible;
  - Identifying water quality factors that cannot be improved and need to be managed; and
  - Managing the quality of the water leaving the farm.
- Physical Water Quality Factors (PWQF) is determined by the foreign material that does not dissolve in the water. This type of material like silt can clog emitters and pipes.
- Chemical Water Quality Factors (CWQF) refer to the non-visible qualities of water, and affects crop production, the sustainability of the soil productivity and the effectiveness of the irrigation system.

The Importance of Water Quality in Agriculture

- Water quality has direct and indirect effects on crop production and fruit quality.
- The direct effects of water quality include high salt content causing less water being available for the plant, a high concentration of magnesium interfering with the utilisation of potassium, high concentrations of nitrogen during January to June causing reduced fruit quality and yield, high water pH reducing the availability of nutrients, high chlorine levels in water used for foliar sprays causing scorching, and an oversupply of boron.
- Indirect effects refer to factors that negatively impact on soil, the efficacy of foliar sprays, and that cause the blocking of emitters.
- Indirect effect of water quality include a high water sodium content gradually

destroying the soil structure, the pH value of water used for foliar sprays negatively effecting the efficacy of the sprays and influencing the half-life of certain chemicals, and blocked emitters causing uneven and insufficient water-spread.

- ♦ It is easier and cheaper to control PWQF than CWQF for large volumes of water.
- ♦ PWQF can be improved through sedimentation and filtration.
- ♦ CWQF can be improved by correcting the pH (mostly for water used for foliar sprays) and oxidation, while certain CWQF can be compensated for by dealing with the SAR in the soil maintenance program, and dealing with chlorides by supplying trees with more calcium and supplying nitrogen as nitrates.
- ♦ The quality of water leaving the farm can be improved by preventing nitrogen leaching, controlling the application of chlorides, preventing water runoff, and preventing dumping.
- ♦ Water received on the farm, stored in dams and leaving the farm is regularly tested to determine its quality.
- ♦ A sample is not a piece of the whole, but the whole reduced to a manageable volume.

■ Basic Water Quality Tests and Analyses

- ♦ For water samples, use new or used plastic bottles that have been washed properly with water. Tie labels to the neck or stick them on the outside.
- ♦ Take a water sample by filling the bottle and closing it without leaving an air bubble.
- ♦ pH tests and electrical conductivity (EC) tests are performed on a regular basis.
- ♦ pH test are done with the help of either a pH meter or pH sensitive paper strips
- ♦ EC testing is done with an EC meter.
- ♦ In both pH testing and EC testing a reference standard is used against which the sample is tested.
- ♦ Reporting on water tests involves ensuring the correctness of the standards, ensuring that the units are correct, and comparing the results from previous results of tests taken from the same source.

Session 1 Interpreting parameters and abnormalities in water quality

Learner Guide: Page 11

After completing this session, the learner should be able to:
SO 1: Read, record and interpret certain parameters and abnormalities in water quality

Concept (SO 1)	Time frame	Activities related to the concept
An understanding of the effects of certain physical factors of water and relate and apply them to a relevant specie of animal or plant requiring water are demonstrated. The ability to sample, read and record factors accurately is demonstrated. An understanding of the effects of certain chemical factors is demonstrated. General knowledge of biological processes of animals and plants, which relate to specific physical and chemical quality factors in water are demonstrated.	**4 hours**	**Activity 1**

Please allow learners to complete Activity 1 in their guides

Type of activity	Resources
Individual Exercise: Answer the questions below	Learner guides
Instructions to give to the learners	
Allow the learner time to complete the activity by completing the questions in the learner guide.	

Session 2 Critical Control Points in Water Quality Management

Learner Guide: Page 23

After completing this session, the learner should be able to:
SO 2: Demonstrate an understanding of critical control points in water quality management

Concept (SO 2)	Time frame	Activities related to the concept
An understanding of the water quality requirements and acceptable ranges of a relevant animal or plant species is demonstrated. The ability to make comparisons and to explain and interpret recorded readings of water quality measurements is demonstrated. An ability to explain the physical, chemical and biological requirements and recall acceptable physical and chemical ranges of a relevant animal or plant species is demonstrated.	**4 hours**	**Activity 2**

Please allow learners to complete Activity 2 in their guides

Type of activity	Resources
Group Activity: Divide into groups and discuss…	Learner guides
Instructions to give to the learners	
Divide into groups and discuss the questions in your learner guide. Make notes of the key points of the discussion and decisions.	

Session 3 Water Quality Management Systems

Learner Guide:
Page 32

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

SO 3: Enable corrective action to occur on certain operational or technical issues that control specific physical and chemical factors in water and relate it to specific organism's water quality requirement

Concept (SO 3)	Time frame	Activities related to the concept
An understanding of the working of water quality management systems is demonstrated. The ability to adjust and maintain water quality management systems and equipment is demonstrated. The ability to record and communicating findings on the maintenance of water quality and water quality management systems is demonstrated	**4 hours**	**3**

Please allow learners to complete Activity 3 in their guides

Type of activity	Resources
Group Activity: Divide into groups and discuss…	Learner guides
Instructions to give to the learners	
Divide into groups and discuss the questions in your learner guide. Make notes of the key points of the discussion and decisions.	

Session 4 Concept of Quality Management Systems

Learner Guide: Page 37

After completing this session, the learner should be able to:
SO 4: Ensure that quality assurance systems related to water quality are in place and maintained

Concept (SO 4)	Time frame	Activities related to the concept
The concept of quality management systems is explained. Quality management systems include but are not limited to systems such as GAP, TQM, and QESQuality management systems with regarding to the supply of water to living plant and animal organisms is explained. Improvements regarding water supply and quality systems is recommended.	**3 hours 30 minutes**	**4**

Please allow learners to complete Activity 4 in their guides

Type of activity	Resources
Group Activity: Divide into groups and discussion	Learner guides
Instructions to give to the learners	
Group Activity: Divide into groups and discuss. Make notes of the discussions and decisions.	

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.	