Assessment Guide for Assessors & Facilitators

Water Quality

Level 3

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Title:		**Maintain Water Quality Parameters**					
Applied Title:		**Maintain Water Quality Parameters for Citrus Production**					
Field:		Agriculture and Nature Conservation					
Sub-Field:		Primary Agriculture					
SETA (SGB):		AgriSETA					
Skills Area:		Water Quality					
Context:		Citrus Production					
US No:	116212	**Level:**	3	**Credits:**	2	**Notional Hours:**	20
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Based on the Production Guidelines of:

Supported by:

Unit standard alignment and assessment tool development:
Cabeton Training and Development

Project coordinator:
Jacomien de Klerk

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Directions

Please Note: There is a separate assessment guide for the learner. The learner must use this guide to prepare himself / herself for the assessment.

This assessment guide contains all necessary activities and instructions that will enable the assessor and learner to gather evidence of the learner's competence as required by the unit standard. This guide was designed to be used by a trained and accredited assessor who is registered to assess this specific unit standard as per the requirements of the AgriSETA ETQA.

Prior to the delivery of the program the facilitator and assessor must familiarise themselves with content of this guide, as well as the content of the assessment guide for learners.

The assessor, facilitator and learner must plan the assessment process together, in order to offer the learner the maximum support, and the opportunity to reflect competence.

The policies and procedures that are applicable during the execution of this assessment are available on the website of the Citrus Academy, contained in a document named Policies and Procedures for Assessment, and must be strictly adhered to. The assessor must familiarise himself with this document before proceeding.

This guide provides step-by-step instructions for the assessment process of:

US No:	116212	**Level:**	3	**Credits:**	2

The step-by-step instructions agree and are conducted in concert with the steps described in the learner assessment guide. The steps are as follows:

Step	***Description***	***Timeframe***
1	Pre-Assessment Briefing and Checklist	Before delivery of program
2	Learner Declaration of Authenticity	Before delivery of program
3	Diagnostic Assessment of Learning Assumed to be in Place	Before delivery of program
4	Assessment Plan for Gathering of Evidence	Before delivery of program
5	Learner Formative Assessment Activities	During delivery of program, assessment after delivery of program
6	Summative Presentation	After delivery of program
7	Integrated Summative Assessment Tool	After delivery of program
8	Re-assessment Procedures	After completion of assessment
9	Documentation	After completion of assessment
10	Administration and Completion of Portfolio of Evidence	After completion of assessment

Step 1

Pre-Assessment Briefing and Checklist

A pre-assessment briefing for learners is held before the delivery of the program. Use the checklist below to ensure that all these points are addressed and discussed with the learners.

Pre-Assessment Briefing Checklist		
	√	X
Organise resources – people, equipment, venue, etc.		
Explain the purpose of the assessment		
Discuss the standards or criteria to be used		
Discuss assessment roles and accountabilities		
Decide on assessment venues		
Negotiate evidence required, and where or how this evidence may be gathered		
Explain the methods of assessment that will be used during the gathering and summing up of evidence		
Negotiate the date of submission for the activity workbook and the date for the summative assessment		
Discuss resources required for the assessment e.g. equipment, materials, etc.		
Explain the procedure if the learner is found to be not yet competent		
Explain the appeal and review procedures		
Identify any potential learning barriers and negotiate strategies to overcome these		
Complete and sign the assessment plan with the learner		

The learner and assessor must sign the **Learner Contract** in the learner assessment guide.

Step 2

Learner Declaration of Authenticity

The learner is requested to complete and sign the Declaration of Authenticity in the learner assessment guide. This should be checked and co-signed by the assessor.

The format is as reflected in the learner assessment guide.

Step 3

Diagnostic Assessment of Learning Assumed to be in Place

In the learner assessment guide, the learner is asked to indicate whether they have completed the learning assumed to be in place as prescribed by the unit standard.

The assessor must guide the learners through this step, explaining in detail the content of the mentioned learning areas, because names of learning programs do not always agree with the names of the unit standards, and learners might indicate the incorrect information.

If learners indicate that they have not yet completed the mentioned unit standards, the assessor should prescribe an action plan to allow the learner to obtain the skills required by recommending additional training, competence portfolios, or the relevant RPL assessment for the given unit standards.

The format is as reflected in the assessment guide for learners. Please read it and familiarise yourself with its content.

Step 4

Assessment Plan for Gathering of Evidence

A pro-forma assessment plan for this unit standard has been drafted in the learner assessment guide. Explain the plan to the learner and complete the dates and signatures as indicated.

The format for the assessment plan is as reflected in the assessment guide for learners. Please read it and familiarise yourself with its content. Make a note of the dates agreed upon in the table provided below.

Learner and Assessor Assessment Plan		
Unit Standard	Maintain Water Quality Parameters	
Registration Number	116212	
Step	***Description***	***Completion / Submission Date***
Step 5	Learner Formative Assessment Activities	
Step 6	Summative Presentation	
Step 7	Integrated Summative Assessment	
Step 8	Re-Assessment Procedures	
Step 9	Documentation	
Step 10	Administration and Completion of Portfolio of Evidence	

Step 5

Learner Formative Assessment Activities

The Learner Assessment Guide contains comprehensive activities and worksheets that the learner must complete during the delivery of the learning program. It is imperative that these activities be completed as part of the learning process in order to give the learner the opportunity to develop the skills, knowledge and attitudes that are required for competence.

Learners must complete all the activities in the workbook.

Learners must be encouraged to take control of their learning by indicating areas in the workbook where they experience difficulty.

Learners hand in the Learner Assessment Guide to the assessor or the facilitator, only if the facilitator is a subject matter expert, for the assessment of the formative assessment activities. The assessment of these activities must be done according to the prescribed benchmarks and according to the marking matrix that follows.

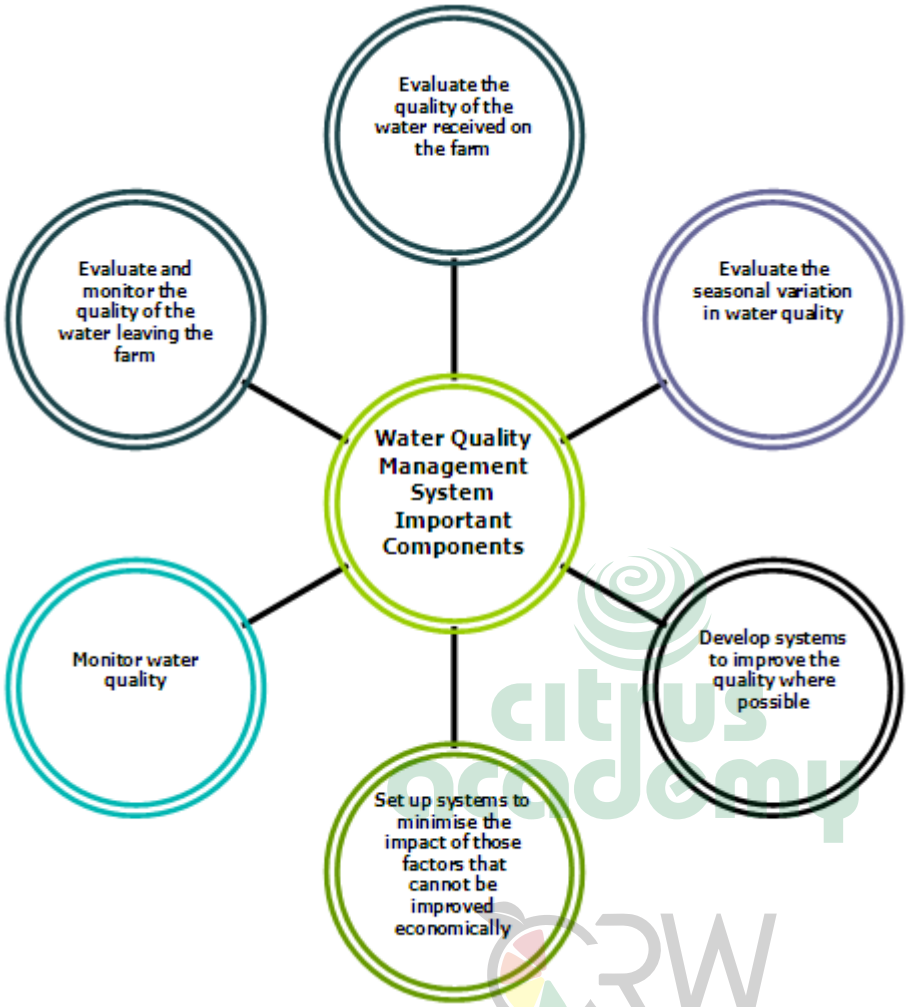
The learner must not move on to the next step before this step has been completed and learners show sufficient capacity and readiness for summative assessment. If problems areas are identified, the learner should be guided with a developmental action plan, which is documented separately and signed by the learner, the facilitator and the assessor.

Model answers are provided below.

Activity 1 – Group Discussion
Discuss the following concepts and the links between them in your group, and make keynotes below. • Quality management • Quality management systems • Water quality management systems
Quality management involves identifying the factors that impact on quality, deciding on the ideal value for each factor, putting in place the systems to ensure that the factors are as close as possible to the ideal, monitoring the factors, and making improvements where necessary. A quality management system encompasses all these steps. A water quality management system is a comprehensive approach to water quality management. It includes all the steps mentioned above, and puts in place all the necessary systems and processes to ensure that water quality is such that it contributes to optimum crop production.

Activity 2 – Mind Map

Draw a mind map depicting the aspects that a water quality management system must address after discussing it in your group.



Activity 3 – Worksheet

In pairs draft a monthly preventive maintenance plan for the following irrigation system equipment that impacts on water quality.

- Couplings
- Filters
- Emitters
- Pressure gauges
- Mainline pipes
- Valves
- Pumps

	Example of Preventive Maintenance Plan for Irrigation and Water QMS for ABC-farm									
Month:		**October 2006**								
		Couplings	**Filters**	**Emitters**	**Pressure Gauges**	**Pipes – Mainline**	**Pipes - System**	**Ball-valves, butterfly valves**	**Sand Filters**	**Pumps**
	Day of the Month	**Tighten grips, Check they have not come undone, Check for cracks**	**Remove, clean, check integrity of filter, check seals and o-rings**	**Unscrew and unblock, ensure no emitter or emitter parts are missing, replace worn-out or blocked emitters,**	**Take pressure reading against previous calibration schedule, Calibrate**	**Check for blockages and leaks, flush, fix leaks and breaks**	**Check for blockages and leaks, flush, fix leaks and breaks**	**Check integrity and replace parts**	**Backwash and Service**	**Electrical wiring and service**
S	1									
M	2	X	X							
T	3			X						
W	4				X					
T	5					X				
F	6						X	X		
S	7									
S	8									
M	9								X	X
T	10	X								
W	11		X							
T	12			X						
F	13				X	X				
S	14									
S	15									
M	16						x	x		
T	17								x	
W	18									x
T	19	X								
F	20		X	X						
S	21									
S	22									
M	23				X	X				
T	24						X			
W	25							X		
T	26								X	
F	27		X							X
S	21									
S	22									
M	30			X				X		
T	31								X	

Activity 4 – Group Brainstorm
Brainstorm as a group and write down a list of the records that you think should be kept for water quality management.
Answers may vary according to learner context, but should include the following elements: • **The current quality of the water** • **Comparisons with previous measurements** • **Actions to improve or maintain the quality or limit the impact** • **A schedule for actions to be taken** • **The outcome of the actions**

Activity 5 – Group Activity
In your group draw a flow diagram of the irrigation system on the farm where you are completing your practical learning. Identify the major and minor critical control points on the flow diagram. Present the flow diagram to the class and indicate the checks and monitoring you would recommend at each critical control point. Make key notes for yourself on the conclusions reached.

The presentation should be delivered by means of a flow chart and verbal presentation referring to the flow chart.
Answers will vary according to learner context and the irrigation systems on the farm where the learner is completing the learning program, but should include the following elements:
• **Where the water is received on the farm**
• **Where the water is used**
  • **Storage (if used)**
  • **Filtration**
  • **Irrigation**
• **Where the water leaves the farm**
The presentation should include checks at each CCP related to the following:
• **Physical and chemical quality of received water**
• **Chemical contamination of water in storage dams**
• **Runoff water from animal houses and orchards**
• **Back flushing water from filters and pumps**
• **Sampling and analysis of suspended solids at filters**
• **Delivery rate of irrigation system**
• **Debris flushed from irrigation pipes**
• **Physical and chemical quality of water leaving the farm**

Activity 6 – Worksheet
Write a short paragraph of no more than 150 of your own words on each of the following topics:
The impact of physical water quality.
Physical water quality impacts on the performance of the irrigation system, because the material that is suspended in water clogs emitters and pipes. The degree to which water quality affects the irrigation system depends on the type of irrigation used. **Citrus are mostly irrigated with micro-irrigation systems, meaning that water is pumped through pipes to emitters that are positioned at individual trees. The emitters that are most commonly used are micro-jets and drippers.** **The openings in these emitters are very small and can become clogged or blocked by debris that is suspended in the water, decreasing the efficiency of the irrigation system. Material that accumulates in pipes can also eventually block the pipes, further decreasing water delivery to the trees.** **Where macro-irrigation, such as basin or flood irrigation, is used, the physical water quality influences the soil and the plant. Silt and seeds are the two physical water quality factors that are of consequence in this case.** **When water that contains silt is used, the silt settles and accumulates on the soil surface over**

time. Citrus is a permanent crop that grows on the same site for many years, and over the years the accumulated silt may form a layer on top of the soil, with completely different chemical and physical properties from the soil below. This may change patterns of root development and water penetration, and eventually have a detrimental effect on production. **Seeds in the water source are carried to the orchard where they germinate and grow. These weeds compete with the tree for water and nutrients, and must be removed and monitored constantly, adding to production costs.**
The impact of chemical water quality on crop production.
Crop production is usually the last to respond to the impact of poor water quality and should not be regarded as an indicator of the water quality. The affect of chemical water quality on crop production can be seen in suboptimal yields, decreasing fruit size, erratic blossom, and a decrease in the number of fruit. Many other production factors can however be the cause of these problems. **The total dissolved salts (TDS) impacts specifically on crop production because the higher the salt content of the water, the more energy a plant needs to utilise the water. This energy would have been better spent on producing vegetative material, such as leaves, shoots and roots, and fruit. Citrus trees irrigated with water containing moderately high concentrations of salts usually produce smaller fruit. When the salt content increases, the number of fruit produced by the tree decreases.** **The salt content of water is also of importance with irrigation systems that wet the leaves, such as rain replacement systems. High concentrations of salts can scorch the leaves and cause them to drop prematurely.**
The impact of chemical water quality on sustainable soil productivity in terms of salinity.
The total dissolved salts (TDS) is the factor that most significantly affects soil salinity. Water applied to the soil is either utilised by the plants or evaporates from the surface, leaving salts behind in the soil. Because of irrigation, this process is repeated several times per month. **The rate at which salts accumulate depends, amongst other factors, on the concentration of dissolved salts in the water. Apart from erosion, this is the most important cause of the loss of productive soils. This process is called salinisation of soil, or "verbrakking" in Afrikaans.** **Salinity can be detected by the pH, resistance or electrical conductivity (EC), and the sodium and chloride content of the soil. An increase in pH, EC and / or sodium and chloride content is the first signs of salinisation. To detect changes in the concentration of these parameters, all results must be recorded. Recordkeeping is the fundamental requirement for any water quality management system.** **When the concentration of sodium exceeds 5% of the total cations, salinity becomes a real threat and additional analyses are required. Additional analyses include the sodium adsorption ratio (SAR) and electrical conductivity (EC) of saturated soil paste, which is a sample of the soil that has been mixed with water.**
The impact of chemical water quality on sustainable soil productivity in terms of crusting.
Crusting refers to when the top few millimetres of the soil becomes much harder and more brittle than the soil immediately underneath it. This is caused by a decrease in the relative concentration of calcium as a result of irrigation with water that is too fresh, meaning water with a very low concentration of salts, or water containing too much sodium. **Crusting impedes the infiltration of water into the soil, and thereby causes more water to run off, which contributes to soil erosion.** **The first sign of crusting is runoff of water halfway through the irrigation cycle. Runoff occurs when the application rate exceeds the infiltration rate of water into the soil. Initially the infiltration rate exceeds the application rate and the water will disappear quickly. After a while, the top layer closes, reducing the infiltration rate, and water accumulates on the surface. Less water than intended reaches the roots, although the correct volume was applied.**
The impact of chemical water quality on the irrigation system.
The efficiency of an irrigation system is determined by the degree of corrosion, the deposits, or scale, in the piping, and the blockages of the emitters. These three critical points are all affected by chemical water quality factors.

The total dissolved salts is one of the factors contributing to the corrosive potential of water. The concentration and type of dissolved salts determine to what extent water contributes to the corrosion of irrigation equipment.
Apart from erosion, the concentration and types of salts also determine to what degree water adds to the problem of scale forming and blockages of micro-jets and drippers.
Three indexes are used to quantify the potential of water to corrode, form scale and block emitters, namely the Langelier, Rysnar and Aggressiveness Indexes. In this regard, the concentration of calcium, magnesium and carbonate are specifically important.

Activity 7 – Group Presentation

In your groups, select on of the topics below and prepare a multimedia presentation. Present it to the rest of the class. Make key notes for yourself on each topic that is presented.

Topic 1: The impact of physical water quality on the irrigation system.

Citrus are mostly irrigated with micro-irrigation systems, meaning that water is pumped through pipes to emitters that are positioned at individual trees. The emitters that are most commonly used are micro-jets and drippers.
The openings in these emitters are very small and can become clogged or blocked by debris that is suspended in the water, decreasing the efficiency of the irrigation system. Material that accumulates in pipes can also eventually block the pipes, further decreasing water delivery to the trees.
Where macro-irrigation, such as basin or flood irrigation, is used, the physical water quality influences the soil and the plant. Silt and seeds are the two physical water quality factors that are of consequence in this case.
When water that contains silt is used, the silt settles and accumulates on the soil surface over time. Citrus is a permanent crop that grows on the same site for many years, and over the years the accumulated silt may form a layer on top of the soil, with completely different chemical and physical properties from the soil below. This may change patterns of root development and water penetration, and eventually have a detrimental effect on production.
Seeds in the water source are carried to the orchard where they germinate and grow. These weeds compete with the tree for water and nutrients, and must be removed and monitored constantly, adding to production costs.

Topic 2: The impact of chemical water quality on the irrigation system.

The efficiency of an irrigation system is determined by the degree of corrosion, the deposits, or scale, in the piping, and the blockages of the emitters. These three critical points are all affected by chemical water quality factors.
The total dissolved salts is one of the factors contributing to the corrosive potential of water. The concentration and type of dissolved salts determine to what extent water contributes to the corrosion of irrigation equipment.
Apart from erosion, the concentration and types of salts also determine to what degree water adds to the problem of scale forming and blockages of micro-jets and drippers.
Three indexes are used to quantify the potential of water to corrode, form scale and block emitters, namely the Langelier, Rysnar and Aggressiveness Indexes. In this regard, the concentration of calcium, magnesium and carbonate are specifically important.

Topic 3: The impact of biological water quality on the irrigation system.

The biological factors that impact on the quality of irrigation water and water used for foliar sprays are limited to those that aggravate the clogging of emitters. Chemical changes caused by biological activities are only of importance in fairly heavily contaminated water.
The biological processes that influence the efficiency of the irrigation system include the activities of bacteria and fungi, which form slimes and filaments, and reduce manganese, iron and sulphur. The cumulative results of these activities may cause other physical particles to accumulate in the irrigation system, causing clogging of the emitters.
Under anaerobic conditions, such as in boreholes, sulphates can be reduced by bacteria to form sulphuric acid. Sulphuric acid damages the metal in the pipes and valves of borehole. The most obvious symptom of this process is nodules containing black or dark brown powdery material.

This process continues to create holes in the metal and will destroy it eventually. The presence of sulphate reducing bacteria (SRB) in boreholes therefore has a negative effect on the underwater equipment.

Activity 8 – Ask an Expert

In pairs, go to the farm on which you are completing your practical learning and ask an expert how to do the tasks below. If possible, attend a practical demonstration of the procedures.

Draft step-by-step instructions in your own words for a new member of your team on how to conduct these tasks correctly.

Task 1: Measure the delivery rate for micro-jets in litres per hour.

- **Remove the micro-jet and put the riser tube in a suitable container to collect the water.**
- **Let the water run into this container for a set period, for instance 60 seconds.**
- **Measure the volume of water emitted in 60 seconds, for instance 500ml.**
- **Calculate the litres emitted per hour, as follows:**
  Volume Collected x 3,600 seconds / number of seconds measured
  = 500 x 3,600 / 60
  = 30,000ml
  = 30 litres per hour
- **Compare this with the specified delivery rate for the particular micro-jet.**

Task 2: Measure the delivery rate for drippers in litres per hour.

- **Place a suitable container below the dripper to collect the water. Ensure that the water does not run away from the container along the pipe. The dripper must be the lowest point and over the container.**
- **Let the water drip into this container for a set period, for instance 30 minutes.**
- **Measure the volume of water emitted in the 30 minutes, for instance 750ml.**
- **Calculate the litres emitted per hour, as follows:**
  Volume collected x 60 minutes / number of minutes measured
  = 750 x 60 / 30
  = 1,500ml
  = 1.5 litres per hour
- **Compare this with the specified delivery rate for the particular dripper.**

Activity 9 – Role Play

Develop detailed, step-by-step instructions on how to take and handle water samples, with special attention to possible pitfalls and the equipment that is required. Divide into pairs, and explain to your partner how to complete this task.

<u>Sampling Procedure</u>

- **Rinse the container and cap three times with the water to be sampled;**
- **Fill the bottle to capacity and screw the cap on, leaving no air space at the top;**
- **Label the bottle; and**
- **Put aside in the shade and dispatch as soon as possible to the laboratory.**

<u>Labelling Procedure</u>

- **Stick a label onto the container or tie it to the neck of the bottle.**
- **Write all relevant information on the label with a waterproof pen.**
- **The minimum information on the label includes:**
  - **The name of the farm or farmer;**
  - **The identification number or name of the water source;**
  - **If only one water sample is submitted, also write the contact information of the farm or farmer on the label. Where more than one sample is submitted from the same farm or farmer, at least one label should contain all the relevant information and the rest only the farm or farmer name and the name or number of the water source.**

Possible Pitfalls

The most appropriate container for water samples is a plastic bottle with a screw cap. In practise, 500ml mineral water or cold drink bottles made from polycarbonate is very suitable for this purpose. Special bottles for water sampling are also available on the market.
Wash all containers that are being reused properly with warm water, but do not use a detergent. Take care that the cap is also washed properly. Do not use caps with cardboard or absorbing seals. Before taking a sample in a properly washed reused or new container, rinse it three times with the water to be sampled. Also rinse the caps.
Never write directly on the bottle, because the lettering could be rubbed off during transportation.
Special procedures are followed when sampling water from various water sources.

- **Canals – Sample the water at in the middle of a running canal.**
- **Boreholes – Let the pump run for at least one hour or for as long as it takes to fill all piping with fresh water. Never sample the water standing in the pipes.**
- **Storage Dams – Take the sample away from the sides or wall of the dam and 50cm below the surface.**
- **Rivers – Take the sample in the flow of the river. Standing water accumulates suspended material and has a higher concentration of salts.**
- **Water from Irrigation Pipes – If the purpose of the sampling is to measure the quality of the irrigation water, remove a micro-jet or open the end of a lateral line. Let the water run to flush the pipes, and then fill the bottle. If the purpose is to measure the type and mass of the deposits, open the end of two or three laterals into a suitable container with a capacity of about 50 litres. Then take the sample from this container while stirring the water.**

Activity 10 – Worksheet
Write a short paragraph in your own words on each of the following topics.
Excessive leaching as it relates to water quality management in general and to the interpretation of abnormal water quality records specifically.
Some elements such as nitrates, chlorides and even sodium moves quite easily through the soil profile and can be leached out of the soil. If these elements are transported to the waterways, they will end up in the water leaving the farm and will have a negative impact on the quality of the water available downstream. **Chlorides and sodium should be leached to the soil layers below the root-zone. This is however not always manageable due to rainfall, which adds to the leaching caused by irrigation. Chlorides must be used in a sound fertilisation program and in conjunction with proper irrigation scheduling.** **Over-irrigation is the main culprit in terms of the excessive leaching of nitrates. When too much water is applied after or during nitrate applications, the nitrate is leached beyond the roots. In such cases more nitrogen will be required to satisfy the demand of the trees, which results in even more leaching. Evaluating the magnitude of leaching of nitrates should therefore form part of the fertilisation program. High concentrations of nitrates in the water stimulate microbial and aquatic growth and render the water less suitable or more expensive to use.**
Waste management as it relates to water quality management in general and to the interpretation of abnormal water quality records specifically.
All soluble waste must be disposed of in a manner that will prevent these materials from ever entering the waterways. **A proper designed waste disposal system is essential on any farm. No chemical container should be rinsed and no expired or unused chemical should be exposed of in a manner that can lead to the chemicals entering the water system. Most suppliers of chemicals supply a disposal service.**
Sewerage disposal as it relates to water quality management in general and to the interpretation of abnormal water quality records specifically.
Untreated sewerage, including animal and human waste, must never be allowed to enter the

water ways. Ensuring that the disposal areas for sewerage are far from open or underground water source is no guarantee that it will not contaminate the water. It is essential to ensure that the sewerage is properly decomposed in the allocated site.
The use of microbial decomposition processes contributes less towards pollution that chemical processes. However, the monitoring of these disposal sites need to be formalised and managed. Ongoing analyses of the water sources to determine the total organisms, as well as the presence of coli-form bacteria, aid in keeping the water sources free of sewerage contamination. Coli-form bacteria are associated with contamination by raw sewerage.

Marking Matrix and Assessor Report for Formative Assessment Activities Formative Evidence Collection Summary for Unit Standard 116212 – Level 3					
	Action Required from Learner to Develop Competence	***Competence Assessments***	***Standard for Activity***	***Allocation of Marks***	***Feedback to Learner and Comments on Evidence***
Specific Outcome 1: **Read, record and interpret certain parameters and abnormalities in water quality** *Range:* This will include but is not limited to physical factors, temperature, chemical factors (dissolved gasses), pH, biological processes (photosynthesis, nitrogen cycle and decomposition), organic load, etc.	Attend classroom lesson, participate and ask questions	Activities in learner activity book were completed correctly	Activity answers must be at least 85% correct A signature and commentary from the supervisor / coach / mentor or facilitator in learner Workbook	As per model answer sheet	
Specific Outcome 2: **Demonstrate an understanding of critical control points in water quality management**	Attend classroom lesson, participate and ask questions	Activities in learner activity book were completed correctly	Activity answers must be at least 85% correct A signature and commentary from the supervisor / coach / mentor or facilitator in learner Workbook	As per model answer sheet	
Specific Outcome 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 a specific organism's water quality requirement** *Range:* Nitrogen, phosphorous and magnesium deficiencies	Attend classroom lesson, participate and ask questions	Activities in learner activity book were completed correctly	Activity answers must be at least 85% correct A signature and commentary from the supervisor / coach / mentor or facilitator in learner Workbook	As per model answer sheet	

Marking Matrix and Assessor Report for Formative Assessment Activities Formative Evidence Collection Summary for Unit Standard 116212 – Level 3					
	Action Required from Learner to Develop Competence	***Competence Assessments***	***Standard for Activity***	***Allocation of Marks***	***Feedback to Learner and Comments on Evidence***
***Specific Outcome 4:* Ensure that quality assurance systems related to water quality are in place and maintained**	Attend classroom lesson, participate and ask questions	Activities in learner activity book were completed correctly	Activity answers must be at least 85% correct A signature and commentary from the supervisor / coach / mentor or facilitator in learner Workbook	As per model answer sheet	
US CCFO: Identifying	Attends all lessons, activities, practical and completes activities and workbook as per instructions	Attendance register and facilitator report	Learner must at least be present and no negative commentary about the learner should be made in the facilitator report.	N/a	
US CCFO: Working					
US CCFO: Organising					
US CCFO: Collecting					
US CCFO: Communicating					
US CCFO: Science					
US CCFO: Demonstrating					
US CCFO: Contributing					

Assessment Feedback Form – Activity Workbook			
	Comments / Remarks		
Feedback to learner on assessment			
Feedback from learner to assessor			
Learner's Signature		**Date:**	
Assessor's Signature		**Date:**	

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Step 6

Learner Poster and Presentation

Before the summative task is undertaken, the learner must be reminded of what is expected from him / her in terms of summative and reflexive competence. Read and explain to the learner this section in the learner assessment guide. The learner and assessor must sign off this section to acknowledge that this step was completed.

- Use the planning and questioning format below to help you collect evidence for foundational and embedded knowledge as prescribed by the outcomes of the unit standards.
- Provide the questions as listed to the learners as a guide.
- Ensure that you apply the exact same methodology for each learner in order to ensure that VACS principles are adhered to.
- The benchmark for learner competence is an 85% overall test score.
- Only a suitably qualified and registered assessor who is ALSO a subject matter expert in this specific field can mark this assessment tool for learner assessment.
- If no such a person can be found to assess the learner, then it is advised that a qualified assessor consults with the appropriate subject matter expert prior to the assessment in order to establish key points for competence and / or uses model answers as supplied by a subject matter expert to allocate marks. The subject matter expert should be consulted for any answers that the assessor might have queries on.
- Use a header in the following format for each test paper:

Unit Standard:	116212	**NQF Level:**	3
Learner Name			

- The assessor should use the questions below as a marking matrix and to gather evidence and to check for completeness.

The poster should cover the following and evidence should be found for these:

- 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

The presentation should be:

- A multimedia based presentation, using the posters supplied in this workbook as a resource.
- No longer than 15 minutes in duration
- Should be planned according to the guidelines listed below, and should include information on ALL the points.

The evidence required by the assessor will be obtained from the following sources:

Written information as completed in the planning notes of the workbook	60%
Oral communication from multimedia presentation	30%
Correct interpretation and applied use during presentation of the given resource posters and pictures.	10%

Step 7

Integrated Summative Assessment Tool

One assessment tool is provided in this step, being:

1. Attitudes and Attributes Assessment Tool

This assessment tool has been drafted in its entirety and follows below. It must be copied and completed for every learner in the same manner and according to the same procedure.

Learners must not be given these tools in preparation for summative assessment. This corresponding step in the Learner Assessment Guide is a direct reflection of these tools and is drafted in a format that is appropriate to the learner's level of language competence.

1. Attitudes and Attributes Assessment Tool

- Use this rating scale to judge the learner's CCFO competence according to the unit standard.
- The learner's entire performance and all the stages of learning, as well as all gathered evidence must be considered for this section.
- It is advised that the assessor consult with facilitators, mentors, coaches and supervisors in order to ensure that an objective rating is allocated.
- A rating between 1 and 5 should be given, as follows:

Rating	***Description***
1	No evidence can be found
2	The evidence found is weak and this is still a major development area for the learner
3	The evidence found meets the average expectation for a learner on this level
4	The evidence found is of a high quality and exceeds the average standard expected
5	The evidence found is outstanding and the learner attitudes and traits are very well developed

- Learner must be given constructive feedback on each rating.
- Ensure that you apply the exact same methodology for each learner in order to ensure that VACS principles are adhered to.
- The benchmark for learner competence in this tool is 3:5 in EVERY CCFO.

At the end of this step, an assessment feedback form is provided which must be completed and signed by the assessor, learner and moderator, where applicable.

Attitudes and Attributes Assessment Tool

Use the following rating table in this assessment:

Rating	***Description***
1	No evidence can be found
2	The evidence found is weak and this is still a major development area for the learner
3	The evidence found meets the average expectation for a learner on this level
4	The evidence found is of a high quality and exceeds the average standard expected
5	The evidence found is outstanding and the learner attitudes and traits are very well developed

CCFO Criteria	***Rating***
Identifying – The learner can identify problems and deficiencies correctly.	
Working in a Team – The learner is able to work well as member of a team.	
Organising – The learner works in an organised and systematic way whilst performing all tasks and tests.	
Communicating – The learner is able to communicate his or her knowledge orally and in writing, in a way that shows what knowledge he or she has gained.	
Demonstrating – The learner is able to show and perform the tasks required correctly.	
Contributing – The learner is able to link the knowledge, skills and attitudes that he or she has acquired in this module of learning to specific duties in their job or in the community where he or she lives.	
Science – Learner is able to utilise and use science and technology effectively	
Collecting – Learner can effectively gather information	

Assessment Feedback Form			
	Comments / Remarks		
Feedback to learner on assessment and / or overall recommendations and action plan for competence			
Feedback from learner to assessor			
Assessment Judgement	You have been found: ❍ Competent ❍ Not yet competent in this unit standard	Actions to follow: ❍ Assessor report to ETQA ❍ Learner results and attendance certification issued	
Learner's Signature		**Date:**	
Assessor's Signature		**Date:**	
Moderator's Signature		**Date:**	

Step 8

Re-Assessment Procedures

- Note that only outcomes on which the learner was found not yet competent must be re-assessed.
- The same procedures in steps 6 and 7 are repeated.
- The tool must be adapted at discretion of the assessor. Best practice is not to present the exact same format and questions if possible.
- Use your expertise and judgement to ensure that the method of re-assessment remains integrated and relevant to the expected outcomes.

Step 9

Documentation

The following documentation is addressed in this step:

1. Learner and assessor information reports;
2. Assessor report and summative evidence collection summary;
3. Learner assessment re-actionnaire;
4. Assessor's assessment review and improvement document;
5. Assessment appeal form

1. Learner and Assessor Information Forms

The learner information form is in the assessment guide for learners. The assessor information form follows. These forms must be completed for each individual learner and placed in the learner's portfolio of evidence.

2. Assessor Report and Summative Evidence Collection Summary

This report follows after the information report. Use it to summarise the findings during assessment. Please complete the copy of this report that is in the learner assessment guide.

3. Learner Assessment Re-Actionnaire

A pro-forma for the learner assessment re-actionnaire is included in the learner assessment guide. Ask the learner to complete this form and sign it.

4. Assessor's Assessment Review and Improvement Document

The assessor is expected to complete the assessor review of the assessment process, using the pro-forma document of which an example follows. Please complete the copy of the document in the learner assessment guide. This document must be discussed with the learner and any learner commentary should be recorded.

5. Assessment Appeal Form

The assessment appeal form is also provided in the learner assessment guide. Assist the learner to complete the document if necessary.

The learner must be requested to sign-off all reports and documents before they are placed in the portfolio of evidence.

Assessor Information Form				
Unit Standard	116212			
Program Date(s)				
Surname				
First Name				
Company Name				
Job / Role Title				
Home Language				
Gender	Male		Female	
Race	African	Coloured	Indian/Asian	White
Employment	Permanent		Non-permanent	
Disabled	Yes		No	
Date of Birth				
ID Number				
Contact Telephone Numbers				
Email Address				
Postal Address				

Assessor Report and Formative and Summative Evidence Collection Summary for Unit Standard 116212 – Level 3					
Description	***Evidence Gathered***		***Benchmark***	***Competent / Not yet Competent***	***Feedback and Comments***
	Foundational and Embedded Knowledge	**Practical Skills, Underpinning Knowledge and Reflexive Competence**			
Specific Outcome 1: **Read, record and interpret certain parameters and abnormalities in water quality** *Range:* This will include but is not limited to physical factors, temperature, chemical factors (dissolved gasses), pH, biological processes (photosynthesis, nitrogen cycle and decomposition), organic load, etc.	Poster and Presentation	CCFO Rating Scale	85% competence in all areas		
Specific Outcome 2: **Demonstrate an understanding of critical control points in water quality management**	Poster and Presentation	CCFO Rating Scale	85% competence in all areas		
Specific Outcome 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 a specific organism's water quality requirement** *Range:* Nitrogen, phosphorous and magnesium deficiencies	Poster and Presentation	CCFO Rating Scale	85% competence in all areas		
Specific Outcome 4: **Ensure that quality assurance systems related to water quality are in place and maintained**	Poster and Presentation	CCFO Rating Scale	85% competence in all areas		

Assessor Report and Formative and Summative Evidence Collection Summary for Unit Standard 116212 – Level 3					
Description	***Evidence Gathered***		***Benchmark***	***Competent / Not yet Competent***	***Feedback and Comments***
	Foundational and Embedded Knowledge	**Practical Skills, Underpinning Knowledge and Reflexive Competence**			
Embedded Knowledge: The learner is able to demonstrate a basic knowledge of: 1. Names and functions of all the various components of water supply and quality systems 2. Attributes of water related to water quality 3. The requirements of organisms related to their water need 4. The purposes of maintaining relevant water quality for living organisms 5. Measurement and recording technique 6. Water purification techniques and systems 7. Relevant legislation related to the feeding and care of living organisms 8. Relevant legislation related to water use and environmental issues 9. Interpersonal skills related to communication 10. Sensory and documented cues related to water quality 11. Sensory cues related to the water requirements and use of water by living organisms	Poster and Presentation		Overall minimum test score of 85%		

Assessor Report and Formative and Summative Evidence Collection Summary for Unit Standard 116212 – Level 3					
Description	***Evidence Gathered***		***Benchmark***	***Competent / Not yet Competent***	***Feedback and Comments***
	Foundational and Embedded Knowledge	**Practical Skills, Underpinning Knowledge and Reflexive Competence**			
Unit Standard CCFOs: 1. **Problem solving** relates to all specific outcomes 2. **Teamwork** relates to all specific outcomes 3. **Self-organisation and management** relates to all specific outcomes 4. **Information evaluation** relates to all specific outcomes 5. **Communication** relates to all specific outcomes 6. **Use science and technology** relates to all specific outcomes 7. **Inter-relatedness of systems** relates to all specific outcomes 8. **Self-development** relates to all specific outcomes	N/a	Rating Scale	Minimum rating of 3:5 in each criteria or overall average of 3:5		

Assessor's Assessment Review and Improvement Document	
Issues	**Comments**
Did the assessment go according to plan?	
Did anything unexpected happen?	
Were you pleased with the assessment decision; i.e. was it what you expected?	
How could the process have been carried out more efficiently?	
How could the process of assessing the knowledge be improved?	
How could the Performance Observation checklist be improved?	
Was the evidence you gathered sufficient to make a judgment of competence?	
Was the way you obtained feedback from the learner effective?	
Were you pleased with the way you communicated your decision to the learner? If not, how could this have been improved?	
How would you improve the assessment process?	

Any learner has the right of appeal against any not-yet-competent decision by the assessor. If the learner wishes to appeal, please assist him / her to complete the form below.

Appeal Form			
I hereby appeal against the outcome of my assessment.			
Date:			
Learner's Name:			
Assessors Name:			
Organisation:			
Assessment Details: Criteria, role, standards Used, etc.			
Issue to be Reviewed:			
Learner's Signature		**Date:**	
Assessor's Signature		**Date:**	

Step 10

Administration and Completion of Portfolio of Evidence

All the documents or copies thereof, as prescribed previously, must be kept on file as part of the learner portfolio of evidence.

Learner's portfolio of evidence must be readily available for internal and external moderation and verification by the appropriate practitioners, until after the verification process has taken place. The portfolio of evidence may then be kept or returned to the learner according to the service provider's policy.

The prescribed learner results form should be submitted to the ETQA or the National Learner Database as per the SETA procedure.