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**SOUTH AFRICAN QUALIFICATIONS AUTHORITY (SAQA)**

In accordance with Regulation 24(c) of the National Standards Bodies Regulations of 28 March 1998, the Standards Generating Body (SGB) for

Water Sector

registered by Organising Field 12, Physical Planning and Construction, publishes the following Qualification and Unit Standards for public comment.

This notice contains the titles, fields, sub-fields, NQF levels, credits, and purpose of the Qualification and Unit Standards. The full Qualification and Unit Standards can be accessed via the SAQA web-site at www.sqa.org.za. Copies may also be obtained from the Directorate of Standards Setting and Development at the SAQA offices, SAQA House, 1067 Arcadia Street, Hatfield, Pretoria.

Comment on the Qualification and Unit Standards should reach SAQA at the address below and **no later 7 March 2008**. All correspondence should be marked **Standards Setting – Water Sector** addressed to

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SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:**National Certificate: Water and Wastewater Process Control**

SAQA QUAL ID	QUALIFICATION TITLE		
60190	National Certificate: Water and Wastewater Process Control		
ORIGINATOR		PROVIDER	
SGB Water Sector			
QUALIFICATION TYPE	FIELD	SUBFIELD	
National Certificate	12 - Physical Planning and Construction	Civil Engineering Construction	
ABET BAND	MINIMUM CREDITS	NQF LEVEL	QUAL CLASS
Undefined	138	Level 3	Regular-Unit Stds Based

This qualification does not replace any other qualification and is not replaced by another qualification.

PURPOSE AND RATIONALE OF THE QUALIFICATION**Purpose:**

This qualification will prepare learners to function independently on water or wastewater treatment works. A person acquiring this qualification will be able to operate and control specific processes at a water or wastewater treatment works within the context of legislation and work policies and procedures. This qualification is aimed at people who are expected to make decisions relating to the amount of chemicals dosed, volumes of water treated and pumped. The qualification will provide learners with knowledge and skills to be able to lead a small team or group on a plant as well as to conduct administrative tasks in order to meet organizational objectives.

This qualification forms the foundation for progression and to higher-level qualifications within the water sector as fundamental learning such as mathematical literacy, communication, computer skills and first line supervisory skills are included in the qualification. This qualification focuses on the full development of the learner and further mobility and transportability within the water sector. This qualification will provide learners with key competencies in interpersonal communications skills, measurement skills and quality management skills at a lower level including required at this level.

This qualification will expand the skills base of the qualifying learner and make the person more effective in his/her tasks and more employable and will open up job opportunities in related fields. This qualification will enhance productivity within the water sector and contribute towards the ecological sustainability and improvement of the water environment.

Rationale:

This qualification reflects the workplace-based needs of water and wastewater treatment process for the advancement of the operators in terms of skills and knowledge within the sector. Currently there is no registered qualification on the NQF that bridges the knowledge and skills gap required to fulfill supervisory role on a plant at a lower level between Levels 2 and 4 registered qualifications.

This qualification provides the learner with a career path and progression from water and wastewater process operations to water and wastewater process control within the water sector. The National Certificate in Water and Wastewater Process Operations (Level 2) equips the candidate to operate certain sections on water or wastewater treatment works, whereas the National Certificate in Water and Wastewater Process Control pegged at NQF Level 3 will prepare the candidate to operate more independently on the plant.

The qualification also provides the flexibility to pursue different careers in fields related to the water sector. The level of flexibility within the range of electives will allow the individual to follow a career in a range of water or wastewater operations including careers other related sectors such as pollution control, wet industries, electricity generation, environmental qualifications.

This qualification will enhance productivity within the water sector, improve the health of communities and contribute towards the ecological sustainability and improvement of the water environment.

RECOGNIZE PREVIOUS LEARNING?

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LEARNING ASSUMED IN PLACE

It is assumed that learners are competent in:

- Communication at NQF Level 2.
- Mathematical literacy at NQF Level 2.
- Computer literacy at NQF Level 2.

It also assumed that learners are competent in the following unit standards

- ID 246450: Demonstrate knowledge of water treatment process at NQF Level 2.
- ID 246460: Demonstrate knowledge of wastewater treatment process at NQF Level 2.
- ID 246459: Apply personal safety practices in the workplace at NQF Level 2.

Access to Qualification

Access to this qualification is open bearing in mind learning assumed to be in place.

QUALIFICATION RULES

Fundamental:

- 36 credits should be achieved in fundamental.

Core:

- 87 credits should be achieved in core component of this qualification.

Elective:

Learners must choose electives unit standards with a minimum total value of 15 credits in the elective component.

It is further recommended and mandatory that learners who specialise in wastewater competencies should choose the Activated Sludge Unit Standard as an elective.

EXIT LEVEL OUTCOMES

1. Compare water and wastewater works performance with legislative and workplace requirements at an operational level.

- Range: Works performance includes but is not limited to the quality and quantity of effluent, quality and quantity of sludge.
2. Interpret and apply legislation relevant to the operation of water and wastewater treatment works.
 3. Apply communication and leadership skills at the working environment.
 4. Demonstrate of administration required on a wastewater treatment works.
 5. Use the System International (SI) and appropriate formulae to perform calculations needed to operate water or wastewater treatment plant.

Critical Cross-Field Outcomes:

- Identify and solve problems relating to water flow using measurements and calculations.
- Work effectively with others as a leader and member of a team on a daily basis to effectively produce potable and quality water by applying procedures and complying with organisational standards.
- Organise and manage oneself and one's activities responsibly by identifying resources required to operate and control the water and wastewater plant.
- Communicate effectively using appropriate verbal and nonverbal skills to promote good working relationships in the working environment.
- Demonstrate an understanding of the world, as a set of related systems by recognizing the inter-relationships between role-payers and customers in the water and wastewater treatment works.
- Use science and technology to produce quality water and wastewater treatment on a plant.

ASSOCIATED ASSESSMENT CRITERIA

Associated Assessment Criteria for Exit Level 1:

- 1.1 Results of plant tests are compared with regulated or organizational standards.
 - 1.2 The production of water or the treatment of the effluent meets the requirements of the community in terms of quality and quantity.
 - 1.3 The plant is operated in accordance with environmental requirements in order to meet national and organisational policies relating to nuisance conditions.
- Range: Nuisance conditions refer to but are not limited to odours, flies and noise.

Associated Assessment Criteria for Exit Level 2:

- 2.1 Personal safety practices are identified and applied in accordance with standard operating procedures and safety requirements in a water and wastewater environment.
- 2.2 Personal health, hygiene and presentation in a wastewater environment is maintained according to the Occupational Health and Safety Act.
- 2.3 Water and wastewater treatment is applied in terms of the National Water Act and the Water Services Act.

Associated Assessment Criteria for Exit Level 3:

- 3.1 Verbal and non-verbal skills are applied to promote interaction and teamwork on a water and wastewater works.
- 3.2 Technology applicable in the water and wastewater treatment works is used to achieve communicative objectives in the workplace.
- 3.3 Conflict management techniques are applied to handle conflict within own scope of responsibility on a wastewater treatment works.
- 3.4 Leadership skills are applied to lead and promote teamwork.

Associated Assessment Criteria for Exit Level 4:

- 4.1 The functions of administration are identified and explained in terms of water services provision.
- 4.2 Administration tasks and activities are identified and described in accordance with organizational policies and procedures to achieve administrative objectives in the water and wastewater treatment plant.
- 4.3 Own work and workload is organized in accordance with organisational works policies and procedures.

Associated Assessment Criteria for Exit Level 5:

- 5.1 Measurements are taken and used to adjust operating parameters on a water and wastewater treatment plant.
 - Range: Measurements include but are not limited to volumes, concentration, flow rates, density, retention time and chemical dosage.
- 5.2 Production quantities are compared with targets to determine the performance of the treatment plant.

Associated Unit Standard:

- ID 254123: Demonstrate knowledge of SI measurement units used in water and wastewater treatment.

Integrated Assessment:

Integrated assessment at the level of qualification provides an opportunity for learners to show that they are able to integrate concepts, ideas and actions across unit standards to achieve competence that is grounded and coherent in relation to the purpose of the qualification. Integrated assessment should show how already demonstrated competence in individual areas can be linked and applied for the achievement of a holistic outcome.

Integrated assessment must judge the quality of the observable performance, and also the quality of the thinking that lies behind it. Assessment tools must encourage learners to give an account of the thinking and decision-making that underpin their demonstrated performance. Some assessment practices will demand practical evidence while others may be more theoretical, depending on the type of outcomes to be assessed, and the nature and level of the qualification. The ratio between action and interpretation is not fixed, but varies according to the demands of the qualification.

While the generic component (literacy, communication and life skills) of this qualification at NQF Level 3 can be assessed through occupational contexts and activities relating to water and wastewater treatment, care must be taken in both the learning programme and the assessment to ensure that these foundational skills are truly portable. The primary aim of this qualification is to ensure that learners have a sound base of general education to prepare them for further learning, whatever career path they may choose. Learners must be able to transfer generic skills such as language, computation and learning skills etc across a number of different contexts, and apply them within a number of learning areas.

A broad range of task-orientated and theoretical assessment tools may be used, with the distinction between practical knowledge and disciplinary knowledge maintained so that each takes its rightful place. Unit standards in the qualification must be used to assess specific and critical cross-field outcomes. During integrated assessments the assessor should make use of formative and summative assessment methods and should assess combinations of practical, applied, foundational and reflexive competencies.

INTERNATIONAL COMPARABILITY

This qualification and component unit standards have been compared with similar qualifications including short courses and/or training programmes from various countries which include, Australia, New Zealand, France and United Kingdom. Other countries searched include Scotland, United States of America and Canada. The countries were chosen specifically on their bases of their approach in water and wastewater treatment processes or control processes to produce clean water that is essential for good health and safe to drink, treat wastewater both from domestic and industrial so that it is safe to return to the environment. Best practices have been considered in relation to education and training in water and wastewater related qualifications/courses in the study. Another reason for the choice of the countries was to find out as close as possible, countries whose water and wastewater process control systems including climate conditions are similar to the South African context. New Zealand was the mostly preferred country as their water and wastewater treatment processes are very similar to South Africa. Given the fact that the qualification is more focused on water and wastewater plant operators at NQF Level 3, qualifications and the relevant awarding bodies accredited to provide a wide range of academic and vocational qualifications including short courses in this field were searched.

New Zealand Qualifications Authority (NZQA):

National Certificate in Wastewater Treatment (Site Operator), Level 3:

This qualification is designed to recognise the core knowledge and skills associated with treatment process management systems, legislation relating to water and wastewater treatment and other competencies relating specifically to wastewater treatment which are similar to the our qualification in that such skills are packaged for wastewater plant operator in the wastewater cluster. The qualification has a water component that is treated as generic unit standards that form part of the qualification.

It must be mentioned however, that some of the competencies in both qualification may be expressed either in a form of unit standard or specific outcomes which shows a slight difference between the two qualification. In addition, it must be born in mind that the South African qualification recognises the commonalities of competencies to be addressed for both water and wastewater plant operations hence these competencies have been reflected in the core component of the qualification since it has been merged into one qualification. New Zealand Water and Environment Training Academy (NZWETA) which is a joint venture between the New Zealand Water and Wastes Association and Opus International Consultants, provides education and training for all sectors of the broader water and wastes industry also offer this qualification. The New Zealand Water and Environment Training Academy's courses have been specially developed to meet the needs of the broader water and wastes industry. The qualifications offered by NZWETA are approved by the New Zealand Qualifications Authority and are recognised by the industry both nationally and internationally. The following unit standards compare favourably with the NQF Level 3 South African qualification in terms of the elements of each unit standard:

- Carry out safe practices when working in water and wastewater treatment plants.
- Operate and monitor a wastewater treatment plant.
- Undertake sampling and testing procedures for wastewater treatment.
- Demonstrate knowledge of process control and monitoring in water and wastewater treatment plants.
- Demonstrate knowledge of oxidation pond and aerated lagoon processes in wastewater treatment.
- Demonstrate knowledge of activated sludge processes in wastewater treatment.
- Demonstrate knowledge of primary processes in wastewater treatment.
- Demonstrate knowledge o preliminary processes in wastewater treatment.

- Operate and monitor a wastewater treatment plant.
- Demonstrate knowledge of sludge digestion processes in wastewater treatment.
- Demonstrate knowledge of pumping systems in wastewater treatment.

The water component - Generic domain consist of the following unit standards that compare well with the South African qualification:

- Carry out safe practices when working in water and wastewater treatment plants.
- Demonstrate knowledge of process control and monitoring in water and wastewater treatment plants.
- Demonstrate knowledge of legislation and agencies relating to water and wastewater treatment.

Other unit standards that are compare with the qualification but are treated as electives are:

- Provide First Aid.
- Take measurements and use them in calculations to solve measurement problems.

NZWETA provides the following qualification that compares well with the South African qualifications:

- National Certificate in Water Treatment (Site Operator).

This qualification covers specialist water treatment skills that compare favourably with this qualification.

The topics covered include:

- Water sources and pre-treatment.
- Taste and odour control theory.
- Sampling theory and practice.
- Drinking water legislation and standards.

United Kingdom (QCA):

City and Guilds Level 3 VQR in Water Engineering:

The City and Guilds is offering this qualification at an Apprenticeship level. The qualification provides learners with skills that will make them qualify in a number of pathways, namely, water networks, in constructions operations, leakage, distribution control and water supply and waster operations. Although the qualification does not compare fully with the South African qualification, the competencies covered to fulfill the requirements of the latter learning pathways, some of competencies compare well with the South African qualification.

The competencies covered are as follows:

- Water treatment processes.
- Carry out testing process.
- Carry out sampling process.
- Carry out mains disinfection.
- Carry out and record meter readings.
- Monitor water system leakage.
- Wastewater activated sludge.
- Wastewater biological treatment.
- Wastewater preliminary and primary treatment.

- Wastewater operations foundation knowledge.
- Sludge treatment and disposal from water and wastewater.

CABWI Awarding Body:

CABWI is an accredited NVQ Awarding Body accredited by the QCA to award National Vocational Qualifications for people working in the water and utilities (electricity and gas) industries. The Scottish Qualifications Authority and CABWI offer the following qualification.

- Controlling Water Operations (Process) Level 3.

The Scottish qualification compares with the South African qualification in that the some of the elements that make up some of the units are comparable with the units standards contained in the qualification as follows:

- Monitoring Treatment Process.
- Monitoring the Operation of Treatment Processes.
- Support the efficient use of resources.
- Maintaining Processing Equipment.
- Contribute to the development of Teams and Individuals.
- Lead the Work of Teams and Individuals to achieve their objectives.

Department for Employment and Learning:

The Department for Employment and Learning offers qualifications on Level 3 Apprenticeship Framework that has been agreed between the Department and Energy and Utility Skills Limited.

The following qualification that compares with the South African qualification is as follows:

- Operate Process Plant Water Wastewater and Sludge, at NQF Level 3.

Australia:

Australian Qualifications Framework (AQF):

Certificate III in Water Industry Operations:

This qualification compares well with the South African qualification. It is pegged at Level 3 and the unit standards address some competencies contained in the South African qualification. Some of the unit standards covered in this certificate have been covered in our NQF Level 2 qualification. These are coagulation and flocculation, as well as sedimentation. However, the unit standards (both core and electives) that compares well and covered by the qualification at NQF Level 3 are:

- Dissolved Air Flotation.
- Activated sludge.
- Trickling filters.
- Introduction to chlorination.
- Monitor, operate and control water treatment processes.
- Monitor, operate and control wastewater treatment processes.
- Customers and Clients.
- Occupational Health and Safety.
- Team Building.
- Monitor and promote customer relations.
- Implement, monitor and coordinate environmental procedures.

- Perform by-law or Water Act enforcement activities.
- Test and commission wastewater collection systems.
- Monitor, identify and respond to water quality problems.
- Inspect and report water catchment operations.
- Monitor and schedule water deliveries.

Scottish Vocational Qualifications (SQA):

- SQA/CABWI Controlling Water Operations, Level 3.
- SVQ Level 3 in Water Industry Operations.

Canada:

The Ontario Environmental Training Consortium:

Ontario Clean Water Agency:

The Ontario Clean Water Agency (OCWA) is a leader provider of water and wastewater treatment services in Toronto and offers training to water and wastewater treatment personnel both professionals and operators at different levels. Regrettably, the site does not provide access to the full unit standards. The certificate programme offered that could compare with some of the unit standards contained in the South African qualification for operators of water and wastewater treatment is as follows:

- Advanced Water Treatment.

This is a three-day courses that covers microbiology, problem-solving, dosage calculations, chemical feed rates and membrane filtration:

- Water Main Disinfection and Repair.

This is a three-day course that covers topics such as purpose of disinfection, types of chlorination and chlorine residuals, calculations involving volume, detention time and chemical dosages, sampling and record keeping, detection methods of broken watermains and repair.

- Basic Wastewater Collection.

This is a two-day course that covers monitoring the rate of wastewater flow to the treatment facilities to ensure overflow does not occur, various sewer collection methods and the required maintenance.

In examining the topics covered in these courses.

United States of America (USA):

In the USA, programmes focus primarily on higher levels than this level, for example, technicians and engineers hence there are no qualifications and standards developed at this level. Nonetheless, there were few short courses found that are offered for Water and Wastewater Operators at entry levels but rather for the different categories of classes.

Rocky Mountain Water and Wastewater Plant Operators Fundamentals School:

The school provides a course intended for those new plant operators to provide them with information needed to better understand water and wastewater treatment and to perform their duties effectively and efficiently. The course is designed to furnish concepts of how treatment processes work and the requirements of government regulations. The South African qualification

also provides learners with knowledge of legislative requirements and regulations in relation to standards to provide the safest drinking water quality.

The course topics include:

- Intermediate Water.
- Intermediate Wastewater.
- Activated sludge.

Penn Foster Workforce Development:

Penn Foster is a career school that provides programmes aimed at improving job performance. It provides the Water and Wastewater Treatment Plant Operator curriculum that provides learners with fundamental knowledge of sewage treatment, sludge processing, various sampling procedures and methods used to obtain the sample for the physical test of wastewater, various types of equipment to test, treat and process raw water, methods of wastewater generation, collection and transportation. This programme compares well with the unit standards contained in the South African qualification which are aimed at water and wastewater plant operators.

Capital Community College:

Certificate programme in Wastewater III:

The curriculum has been designed cooperatively with the Department of Environmental Protection so that the courses will best meet the needs of wastewater treatment plant operations in hiring new employees and in preparing current employees for Class I and II Wastewater Certification examinations.

The safe and effective operation and maintenance of wastewater treatment facilities will be further investigated with an emphasis on larger, conventional treatment plants.

Topics include:

- Activated sludge.
- Sludge digestion and handling.
- Effluent disposal.
- Plant maintenance safety and housekeeping.
- Laboratory procedures.

SADC Region:

In an attempt to do a comparison with the SADC region and emerging economies, searches have been conducted in the following international accrediting bodies.

Regrettably there were no specific qualifications that could be compared with this qualification in the sense that most of the countries searched had limited information on qualifications developed so far, and it has been discovered that some bodies providing accreditation do not use unit standards for accreditation.

Mauritius:

A search was conducted on the Mauritius Qualifications Authority to establish qualifications related to water at this level. It has been discovered that Mauritius so far has developed qualifications in the following fields; Information and Communication Technology; Printing; Tourism and Hospitality Management; Jewellery; Building Construction and Civil Works; Adult Literacy and Health and Social Care. Unfortunately none of these related to this qualification.

However, there is only one unit standard that are contained in this qualification in the Elective component that compare with this qualification:

- Provide First Aid, ID: hs/01/0006/02.

Further searches have been conducted in countries such as Namibia, Kenya, Zimbabwe, Nigeria and Botswana, regrettably there were no qualifications found that could be compared with the South African qualification at this level.

Conclusion concerning comparability:

The search has indicated that the South African qualification compares well in that a substantial degree of similarity was found in the most of the qualifications examined in terms of the occupational profiles and training standards. Generally, the Australian and New Zealand qualifications have been found to be more comparable in terms of the elements of the unit standards when cross-referencing was done against the South African unit standards.

ARTICULATION OPTIONS

Vertical articulation is possible with:

- ID 22672: National Certificate in Water and Wastewater Process Control Supervision at NQF Level 4.

Horizontally articulation is possible with:

- ID60155: National Certificate in Water Reticulation Level 3.

MODERATION OPTIONS

- Anyone assessing a learner or moderating the assessment of a learner against this unit standard must be registered as an Assessor with the relevant ETQA.
- Any institution offering learning that will enable the achievement of this unit standard must be accredited as a provider with the relevant ETQA.
- Assessment and moderation of assessment will be overseen by the relevant ETQA according to the ETQA's policies and guidelines for assessment and moderation.
- Moderation must include both internal and external moderation of assessments at exit points of the qualification, unless ETQA policies specify otherwise. Moderation should also encompass achievement of the competence described both in individual unit standards as well as the integrated competence described in the qualification.

CRITERIA FOR THE REGISTRATION OF ASSESSORS

- The assessor must have a qualification at or above the level of this qualification plus a minimum of two years practical, relevant occupational experience.
- Competency in all the outcomes of the generic assessor standard.
- Detailed documentary proof of educational qualification, practical training undergone, and experience gained by the applicant must be provided (Portfolio of evidence).
- To demonstrate competence in relation to these specified standards and qualifications, at or above, the level of the qualifications in question.
- To meet any other additional requirements laid down by their constituent ETQA.
- The subject matter experience of the assessor can be established by recognition of prior learning.
- The status of registered assessors can be checked on the appropriate ETQA database or website.

NOTES

N/A

UNIT STANDARDS

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Fundamental	119472	Accommodate audience and context needs in oral/signed communication	Level 3	5
Fundamental	9010	Demonstrate an understanding of the use of different number bases and measurement units and an awareness of error in the context of relevant calculations	Level 3	2
Fundamental	9013	Describe, apply, analyse and calculate shape and motion in 2-and 3-dimensional space in different contexts	Level 3	4
Fundamental	119457	Interpret and use information from texts	Level 3	5
Fundamental	9012	Investigate life and work related problems using data and probabilities	Level 3	5
Fundamental	119467	Use language and communication in occupational learning programmes	Level 3	5
Fundamental	7456	Use mathematics to investigate and monitor the financial aspects of personal, business and national issues	Level 3	5
Fundamental	119465	Write/present/sign texts for a range of communicative contexts	Level 3	5
Core	7812	Perform basic calculations	Level 2	3
Core	9882	Read and interpret basic engineering drawings	Level 2	8
Core	113877	Understand fundamentals of electricity	Level 2	8
Core	242870	Apply public sector policies and procedures to achieve administration objectives	Level 3	12
Core	9532	Demonstrate basic knowledge of computers	Level 3	6
Core	254123	Demonstrate knowledge of SI measurement units used in water and wastewater treatment	Level 3	7
Core	254103	Demonstrate knowledge of different methods of achieving disinfection in a water and wastewater effluent environment	Level 3	2
Core	254114	Demonstrate knowledge of quality and its management in water and wastewater context	Level 3	4
Core	254125	Demonstrate knowledge of sampling procedures for water and wastewater treatment tests	Level 3	6
Core	254097	Measure chlorine dosage	Level 3	6
Core	254117	Operate a membrane process	Level 3	8
Core	246446	Operate a rapid gravity filtration process	Level 3	5
Core	255474	Operate mechanical and electrical plant and equipment in a water and wastewater environment	Level 3	6
Core	12058	Demonstrate knowledge and operation of mechanical and electrical systems	Level 4	6
Elective	246445	Operate a biological trickling filter	Level 2	4
Elective	12048	Operate rotating biodisc contactor	Level 2	4
Elective	116534	Carry out basic first aid treatment in the workplace	Level 3	2
Elective	254116	Demonstrate knowledge of activated sludge processes in wastewater treatment	Level 3	6
Elective	254101	Demonstrate knowledge of oxidation pond and maturation ponds processes in wastewater treatment.	Level 3	7
Elective	116942	Use a GUI-based word processor to create merged documents	Level 3	3
Elective	119078	Use a GUI-based word processor to enhance a document through the use of tables and columns	Level 3	5
Elective	119676	Apply the skills of customer care in a specific work environment	Level 4	4
Elective	254134	Control composting process	Level 4	4

LEARNING PROGRAMMES RECORDED AGAINST THIS QUALIFICATION

None



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:**Measure chlorine dosage**

SAQA US ID	UNIT STANDARD TITLE		
254097	Measure chlorine dosage		
ORIGINATOR		PROVIDER	
SGB Water Sector			
FIELD		SUBFIELD	
12 - Physical Planning and Construction		Civil Engineering Construction	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 3	6

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1

Explain the process of chlorination to disinfect water.

SPECIFIC OUTCOME 2

Explain the factors affecting chlorine effectiveness.

SPECIFIC OUTCOME 3

Operate on-site chlorine process.

SPECIFIC OUTCOME 4

Connect and disconnect chlorine cylinders.

SPECIFIC OUTCOME 5

Calculate the average chlorine dosages.

SPECIFIC OUTCOME 6

Record chlorine dosage.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

ID	QUALIFICATION TITLE	LEVEL
Core 60190	National Certificate: Water and Wastewater Process Control	Level 3



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate knowledge of oxidation pond and maturation ponds processes in wastewater treatment.

SAQA US ID	UNIT STANDARD TITLE		
254101	Demonstrate knowledge of oxidation pond and maturation ponds processes in wastewater treatment.		
ORIGINATOR		PROVIDER	
SGB Water Sector			
FIELD		SUBFIELD	
12 - Physical Planning and Construction		Civil Engineering Construction	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 3	7

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1

Explain the purpose of oxidation ponds in wastewater treatment processes.

SPECIFIC OUTCOME 2

Explain the purpose of maturation ponds in wastewater treatment processes.

SPECIFIC OUTCOME 3

Identify the process options for maturation pond wastewater treatment.

SPECIFIC OUTCOME 4

Identify tests and performance measures of oxidation and maturation pond treatment operations.

SPECIFIC OUTCOME 5

Monitor the maintenance of the maturation and oxidation ponds.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	60190	National Certificate: Water and Wastewater Process Control	Level 3



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate knowledge of different methods of achieving disinfection in a water and wastewater effluent environment

SAQA US ID	UNIT STANDARD TITLE		
254103	Demonstrate knowledge of different methods of achieving disinfection in a water and wastewater effluent environment		
ORIGINATOR		PROVIDER	
SGB Water Sector			
FIELD		SUBFIELD	
12 - Physical Planning and Construction		Civil Engineering Construction	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 3	2

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1

Discuss the presence and role of pathogenic micro-organisms in the water and wastewater effluent environment.

SPECIFIC OUTCOME 2

Identify the different methods of disinfection.

SPECIFIC OUTCOME 3

Determine dosages of disinfection.

SPECIFIC OUTCOME 4

Identify the bacteriological tests used to measure the effectiveness of the disinfection process.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	60190	National Certificate: Water and Wastewater Process Control	Level 3



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate knowledge of quality and its management in water and wastewater context

SAQA US ID	UNIT STANDARD TITLE		
254114	Demonstrate knowledge of quality and its management in water and wastewater context		
ORIGINATOR		PROVIDER	
SGB Water Sector			
FIELD		SUBFIELD	
12 - Physical Planning and Construction		Civil Engineering Construction	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 3	4

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1

Explain fundamentals of quality and its management.

SPECIFIC OUTCOME 2

Explain the role of supply chain relationships in quality and its management.

SPECIFIC OUTCOME 3

Explain roles and responsibilities of roleplayers for ensuring quality water supply.

SPECIFIC OUTCOME 4

Describe quality management systems in water and wastewater context.

SPECIFIC OUTCOME 5

Identify approaches to quality improvement.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	60190	National Certificate: Water and Wastewater Process Control	Level 3



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:***Demonstrate knowledge of activated sludge processes in wastewater treatment***

SAQA US ID	UNIT STANDARD TITLE		
254116	Demonstrate knowledge of activated sludge processes in wastewater treatment		
ORIGINATOR		PROVIDER	
SGB Water Sector			
FIELD		SUBFIELD	
12 - Physical Planning and Construction		Civil Engineering Construction	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 3	6

This unit standard replaces:

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
246437	Demonstrate knowledge of activated sludge processes in wastewater treatment	Level 3	6	Will occur as soon as 254116 is registered

SPECIFIC OUTCOME 1

Explain the theory of activated sludge.

SPECIFIC OUTCOME 2

Illustrate the layout of the plant.

SPECIFIC OUTCOME 3

Make adjustments on the plant.

SPECIFIC OUTCOME 4

Monitor performance of the plant.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

ID	QUALIFICATION TITLE	LEVEL
Elective 60190	National Certificate: Water and Wastewater Process Control	Level 3



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:**Operate a membrane process**

SAQA US ID	UNIT STANDARD TITLE		
254117	Operate a membrane process		
ORIGINATOR		PROVIDER	
SGB Water Sector			
FIELD		SUBFIELD	
12 - Physical Planning and Construction		Civil Engineering Construction	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 3	8

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1

Demonstrate knowledge of the principles of membrane processes.

SPECIFIC OUTCOME 2

Prepare membrane plant for service.

SPECIFIC OUTCOME 3

Start-up and monitor the membrane plant.

SPECIFIC OUTCOME 4

Stabilise out of normal conditions.

SPECIFIC OUTCOME 5

Shutdown and isolate out of service plant.

SPECIFIC OUTCOME 6

Clean the membrane plant according to organizations standard procedures.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	60190	National Certificate: Water and Wastewater Process Control	Level 3



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate knowledge of SI measurement units used in water and wastewater treatment

SAQA US ID	UNIT STANDARD TITLE		
254123	Demonstrate knowledge of SI measurement units used in water and wastewater treatment		
ORIGINATOR		PROVIDER	
SGB Water Sector			
FIELD	SUBFIELD		
12 - Physical Planning and Construction	Civil Engineering Construction		
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 3	7

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1

Describe the units used in the standard international (SI) metric system.

SPECIFIC OUTCOME 2

Use formulae to solve for unknown variables.

SPECIFIC OUTCOME 3

Perform calculations in the SI system of measurement.

SPECIFIC OUTCOME 4

Take measurements and use them in calculations to solve problems.

SPECIFIC OUTCOME 5

Describe dilute solution strengths.

SPECIFIC OUTCOME 6

Solve problems involving calculation of time.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	60190	National Certificate: Water and Wastewater Process Control	Level 3



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate knowledge of sampling procedures for water and wastewater treatment tests

SAQA US ID	UNIT STANDARD TITLE		
254125	Demonstrate knowledge of sampling procedures for water and wastewater treatment tests		
ORIGINATOR		PROVIDER	
SGB Water Sector			
FIELD		SUBFIELD	
12 - Physical Planning and Construction		Civil Engineering Construction	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 3	6

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1

Explain the methods of taking samples of water and wastewater for field testing or transport to laboratories.

SPECIFIC OUTCOME 2

Describe the requirements of a sampling plan and of sample handling.

SPECIFIC OUTCOME 3

Record and present measurement data collected during sample collection.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	60190	National Certificate: Water and Wastewater Process Control	Level 3



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:**Control composting process**

SAQA US ID	UNIT STANDARD TITLE		
254134	Control composting process		
ORIGINATOR		PROVIDER	
SGB Water Sector			
FIELD		SUBFIELD	
12 - Physical Planning and Construction		Civil Engineering Construction	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 4	4

This unit standard replaces:

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
12051	Control composting process	Level 2	4	Will occur as soon as 254134 is registered

SPECIFIC OUTCOME 1

Demonstrate knowledge of the production of compost.

SPECIFIC OUTCOME 2

Sample and monitor compost in accordance with work policies and procedures.

SPECIFIC OUTCOME 3

Screen and cure compost.

SPECIFIC OUTCOME 4

Maintain and operate equipment at compost plant.

SPECIFIC OUTCOME 5

Comply with safety procedures at composting plant.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	60190	National Certificate: Water and Wastewater Process Control	Level 3



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Operate mechanical and electrical plant and equipment in a water and wastewater environment

SAQA US ID	UNIT STANDARD TITLE		
255474	Operate mechanical and electrical plant and equipment in a water and wastewater environment		
ORIGINATOR		PROVIDER	
SGB Water Sector			
FIELD		SUBFIELD	
12 - Physical Planning and Construction		Civil Engineering Construction	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 3	6

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1

Operate the plant and equipment in a water and wastewater environment.

SPECIFIC OUTCOME 2

Apply safety procedures during the operation of plant and equipment.

SPECIFIC OUTCOME 3

Demonstrate knowledge of the operations of plant instrumentation.

SPECIFIC OUTCOME 4

Perform routine maintenance of plant instrumentation.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	60190	National Certificate: Water and Wastewater Process Control	Level 3