

No. 450

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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.saga.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 23 May 2008**. All correspondence should be marked **Standards Setting – SGB for Water Sector** and addressed to

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SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:
**Further Education and Training Certificate: Water and Wastewater Treatment
 Process Control Supervision**

SAQA QUAL ID	QUALIFICATION TITLE		
61709	Further Education and Training Certificate: Water and Wastewater Treatment Process Control Supervision		
ORIGINATOR		PROVIDER	
SGB Water Sector			
QUALIFICATION TYPE	FIELD	SUBFIELD	
Further Ed and Training Cert	12 - Physical Planning and Construction	Civil Engineering Construction	
ABET BAND	MINIMUM CREDITS	NQF LEVEL	QUAL CLASS
Undefined	166	Level 4	Regular-Unit Stds Based

This qualification replaces:

Qual ID	Qualification Title	NQF Level	Min Credits	Replacement Status
22672	National Certificate: Wastewater Process Control	Level 4	145	Will occur as soon as 61709 is registered

PURPOSE AND RATIONALE OF THE QUALIFICATION

Purpose:

This qualification is intended for people who are responsible for supervising the operation of individual processes on a water and wastewater works and who are at the same time responsible for coordinating all processes on the works during a shift to ensure that it functions as an integrated whole. This qualification will prepare learners to function independently and in a supervisory capacity to ensure that workers work in accordance with Health and Safety Regulations and relevant legislation. A person acquiring this qualification will be able to operate and control a water-works or/and wastewater works within the context of legislation and work policies and procedures. This qualification forms the foundation for advancement to within the water sector thus providing the learner with core competencies necessary to progress to a higher level. Learners acquiring this qualification will be able to issue instructions on the operations of the works. This qualification focuses on the full development of the learner and further mobility and transportability within the water sector.

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.

People credited with this qualification will be able to:

- > Operate the works.
- > Demonstrate knowledge of hydraulics, valves, pumps and motors.
- > Demonstrate knowledge of relevant national laws, regulations and guidelines as they apply to water or wastewater treatment.
- > Demonstrate an ability to supervise and lead a team.
- > Produce water or final effluent in compliance with the required standards.

> Demonstrate problem solving and investigative skills.

Rationale:

This qualification reflects the workplace-based needs of water and wastewater process operators working in the water sector as expressed by employers and employees. This is one of the qualification that will allow water and wastewater process controllers to meet legal requirements for training stipulated in the regulations for the Water Services Act No. 108 of 1997. This qualification provides the learner with a career path and progression from process operations to process control within the water sector. The qualification also provides the flexibility within the range of electives that will allow the individual to pursue different careers within the water sector. This qualification will enhance productivity within the water sector and contribute towards the ecological sustainability and improvement of the water environment. The individual will have the capacity to advance and gain skills and self-respect and make a meaningful contribution to water treatment.

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 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 to higher-level qualifications at NQF Level 5 in the learning pathway. 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 those 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 as it opens 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.

RECOGNIZE PREVIOUS LEARNING?

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LEARNING ASSUMED IN PLACE

It is assumed that learners are competent in:

- > Communication skills at NQF Level 3.
- > Mathematical literacy at NQF Level 3.
- > Computer literacy at NQF Level 3.
- > Knowledge of sampling and jar testing at NQF Level 3.

Access to the Qualification:

> Open.

QUALIFICATION RULES

The Qualification consists of a Fundamental, a Core and an Elective Component.

To be awarded the Qualification learners are required to obtain a minimum of 166 credits as detailed below.

Fundamental Component:

The Fundamental Component consists of Unit Standards in:

- > Mathematical Literacy at NQF Level 4 to the value of 16 credits.
- > Communication at NQF Level 4 in a First South African Language to the value of 20 credits.
- > Communication in a Second South African Language at NQF Level 3 to the value of 20 credits.

It is compulsory therefore for learners to do Communication in two different South African languages, one at NQF Level 4 and the other at NQF Level 3.

All Unit Standards in the Fundamental Component comprising 56 credits are compulsory.

Core Component:

The Core Component consists of Unit Standards to the value of 90 credits all of which are compulsory.

Elective Component:

The Elective Component consists of three clusters, namely water cluster, wastewater cluster which are areas of specializations each with its own set of Unit Standards including the generic cluster in which learners could opt for such ones to fulfill the requirements of the qualification. Learners are to choose a specialization area and must choose Elective Unit Standards to the value of 20 credits from the Unit standards listed under that specialization.

EXIT LEVEL OUTCOMES

1. Operate the works.
2. Demonstrate knowledge of hydraulics, valves, pumps and motors.
3. Demonstrate knowledge of relevant national laws, regulations and guidelines as they apply to water or wastewater treatment.
4. Demonstrate an ability to supervise and lead a team.
5. Produce water or final effluent in compliance with the required standards.
 - > Range: Required standards refer to SANS 241 and regulations and permit conditions stipulated by Department of Water Affairs and Forestry.
6. Demonstrate problem solving and investigative skills.

Critical Cross-Field Outcomes (CCFOs):

The qualifying learner will be able to:

- > Identify and solve problems relating to water and wastewater on a plant in the form of overloading or under-loading and/or overdosing and under-dosing of chemicals by adding or reducing units in operation or adjusting of chemical dosing rate.
- > Work effectively with others as a leader by allocating tasks to each member of the team and resolving conflict that may exist by applying conflict resolution skills.
- > Organise and manage oneself and one's activities responsibly by planning his own tasks and those of the team to improve productivity.

- > Collect, analyse, organize and critically evaluate information relating to the quality and quantity of water and wastewater received as well as the water and wastewater effluent and sludge.
- > Communicate effectively using appropriate verbal and nonverbal skills including graphical representations to present reports to superiors in relation to work progress and water effluent quality as well as to instruct and train subordinates.
- > Demonstrate an understanding of the world, as a set of related systems by recognizing that a link exists between the water and wastewater environment and efficiency of producing water and wastewater in accordance with the required standards.
- > Use science and technology by applying chemical and biological principles making use of mechanical and electrical technology to produce quality water and wastewater treatment on a plant.

ASSOCIATED ASSESSMENT CRITERIA

Assessment Criteria for Exit Level Outcome 1:

- > Water and wastewater unit processes are controlled according to works procedures.
- > Final water/final effluent meets the prescribed standard in terms of legal and organizational operational standards.
- > Volumes of water or wastewater treated comply with customer demand or released by the customer.
- > Maintenance is planned and coordinated with the relevant section.
- > Reporting procedures for the maintenance of plant and electronic equipment are identified and explained in order to minimise down time.
- > Sample collection and delivery to the laboratory is performed in accordance with works procedures.
- > Laboratory results and on-site tests are interpreted in order to make process changes in accordance with operating guidelines.
- > The importance of keeping records is explained in terms of works procedures.
 - > Range: Records refer to but are not limited to maintenance records, staff records, electricity use and water or effluent quality records.
- > Supervisory Control and Data Acquisition (SCADA) systems and other methods of remote control are utilised in water and wastewater operations.
- > Potential faults occurring in plant and electronic equipment are identified and described for purposes of repair.

Assessment Criteria for Exit Level Outcome 2:

- > Hydraulic principles are explained in terms of operation of water and wastewater works.
- > Simple calculations are performed in order to determine flow rates to provide accurate flow data.
- > Various pumps and valves used for water and wastewater treatment are identified and described in terms of their structure and operational characteristics.
 - > Range: Various pumps include but are not limited to rota dynamic and positive displacement pumps. Valves include but are not limited to isolating valves (gate valves and ball valves), non-return valves, butterfly valves and Saunders valves.
- > Methods of corrosion control are identified and explained in order to protect plant and equipment.
 - > Range: Methods include but are not limited to painting, galvanizing, epoxy coating and electrolytic methods.
- > Various means of measuring flows are explained using diagrams.
- > Range: Means of measuring flows refer to but are not limited to open channel and piped flows.
- > Routine as well as emergency procedures for the starting and stopping of pumps are explained in accordance with working procedures.
- > Methods of checking flow meters are explained for accuracy purposes.
- > Use of flow measuring devices are discussed in terms of their operation in the works.

- > Range: Operation of the works refers to but is not limited to inflow measurement, final discharge measurement and within the works flow measurement, liquid, sludge and gas.
- > Maintenance programmes are followed for flow measurement devices.
- > Range: Maintenance programme include but are not limited to scum, algae, sludge and grease removal.

Assessment Criteria for Exit Level Outcome 3:

- > Relevant sections of the National Water Act are discussed as they apply to wastewater.
- > Relevant sections of the National Water Act and Water Services Act are discussed as they apply to the abstraction from a source and the supply of water to the consumer.
- > SANS 241; Specification for potable water is discussed as it applies to the treatment and sampling of potable water.
- > Requirements of the license conditions issued in terms of the National Water Act are identified to ensure discharge of acceptable effluent and sludge.
- > Demonstrate knowledge of the fundamental legal requirements for safety on a water and wastewater treatment works.
- > Unsafe conditions and acts on a water or wastewater plant are identified and explained in order to prevent exposure by taking the necessary precautions to protect workers health and safety.
 - > Range: Unsafe conditions include but are not limited to exposure to pathogens such as hepatitis, cholera, typhoid; toxic materials (including gas and chemicals), inadequate guards on moving machinery and inadequate hand railings. Precautions refer to active and passive safety precautions on own works.
- > Emergency procedures on own works are explained with simulations.
- > Personal protective equipment is selected for use and maintained to ensure continued efficient protection.
- > Good housekeeping practice is maintained in order to avoid potential dangers.
 - > Range: Good housekeeping includes but is not limited to cleaning sludge and chemical spills, cutting grass, replacing manhole covers, proper storage of chemicals and keeping walkways clear of obstructions, adequate lighting (test and replace light bulbs).
- > The value of records as a tool for safety planning and operating in a water or wastewater treatment plant is explained with examples.
 - > Range: Records refer to but are not limited to equipment check registers and minutes of safety meetings.

Assessment Criteria for Exit Level Outcome 4:

- > Roles and responsibilities of team members are identified and explained in terms of work allocation.
- > Monitoring of allocated tasks is conducted in order to ensure compliance and effectiveness.
- > Conflicts are identified and resolved using conflict resolution strategies.
- > Supervisory principles are applied in order to direct and guide staff to perform their duties in accordance with the work allocation.
- > Staff reports are completed in accordance with organizational requirements.
 - > Range: Staff reports refer to reports on request for discipline and training requirements.
- > On-the job coaching of subordinates is performed in order to reinforce good work ethic and performance.
- > Effective communication skills are applied in dealing with junior and senior staff for problem analysis and solving purposes.
- > Drawings are read, interpreted and used to obtain information on the works.
- > The application of administrative skills to manage a shift in the context of the stock levels, time sheets, shift logs, rosters and time-tables as well as reasons for maintaining records at a treatment plant are discussed in terms of the information and type of record to be kept.
 - > Range: Information and type of record to be kept include but are not limited to shift log book, water and wastewater flows (maximum, minimum, average), weather conditions, plant units in

operation, work in progress, work completed, breakdowns, access control, important communications received and sent and plant units out of service.

Assessment Criteria for Exit Level Outcome 5:

- > Knowledge of standards applicable to water and wastewater effluent is demonstrated with examples.
- > Water and wastewater effluent is monitored through the use of the relevant on-site tests.
 - > Range: Relevant on-site tests include but is not limited to pH, Conductivity, Dissolved Oxygen, Turbidity, Jar Testing, Suspended solids and Residual Chlorine.
- > Laboratory results from different unit processes are interpreted in order to optimise plant performance.
- > Sludge is produced in compliance with specifications and guidelines.

Associated Unit Standards:

- > "Operate telemetric and electronic equipment and scientific instrumentation", ID 12066.
- > "Demonstrate knowledge of activated sludge processes in wastewater treatment".

Assessment Criteria for Exit Level Outcome 6:

- > Water or effluent is monitored through observation and the use of the relevant instrumentation.
- > Records and graphical representations are kept for future reference.
- > The reasons and procedures for performing on site tests are explained in order to optimize the operation of the works.
 - > Range: On-site tests include but are not limited to jar tests, settling tests, dissolved oxygen, temperature, pH, residual chlorine and ammonia.
- > Volumes, flows, dosages and retention times are calculated according to formulae in order to assess plant efficiency and performance.
- > Potential problems relating to water and wastewater treatment works are identified and explained in order to determine corrective action.

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 4 can be assessed through occupational contexts and activities relating to water purification 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 having a best practice in water and wastewater treatment processes are advanced but having more or less similar to South Africa although the use a slightly different approach that may not necessarily suit our context due the different plants they operate. Given the fact that the qualification is more focused on water and wastewater plant operators at 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 was chosen as it is comprised of unit standards that are mostly covered in our qualification although it is pegged at NQF Level 3. It 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:

- > Carry out safe practices when working in water and wastewater treatment plants.
- > 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 of preliminary processes in wastewater treatment.
- > Operate and monitor a wastewater treatment plant.
- > Demonstrate knowledge of pumping systems in wastewater treatment.

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 core and elective components have been developed taking into account South Africa's unique context, but also looking at international best practice. Benchmarking was done against Certificate IV in Water Industry Operations from Australia. The Australian qualification has no fundamental unit standards. The core consists of two unit standards Health and Safety and Environmental Plans and Procedures. The South African qualification has an equivalent for Health and Safety but no equivalent for Environmental Plans. The Australian qualification has electives that cover all fields of water whereas the South African qualification is specific to water operators. Similarities were found in content, level and degree of complexity with the four unit standards that relate to water operators. The Australian qualification is at a slightly higher level and has a greater emphasis on management. Management will be accommodated at level five in the South African context. The fundamental components, reflecting foundational learning and generic skills and knowledge have been derived from registered, local adult education Unit Standards.

Australian Qualifications Framework (AQF):

NWP30101 Water Industry:

> Certificate IV in Water Industry Operations.

The Australian level descriptors are very similar to the South African descriptors. The following unit standards compare well and covered by the qualification at Level 4:

- > Dissolved Air Flotation.
- > Activated sludge.
- > Trickling filters.
- > Introduction to chlorination.
- > Customers and Clients.
- > Occupational Health and Safety.
- > Team Building.

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 fulfil 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. Its training focuses principally on people working in the water and utilities industries. Unfortunately details of the units contained in this qualification could not be obtained hence it is difficult to establish whether the qualifications compare favourably or not.

- > Controlling Water Operations (Process) Level 3.
- > Maintain Water Supply (Network) Level 3.
- > Leakage Control Level 3.

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.

Australian Qualifications Framework (AQF):

NWP01 Water Industry:

- > Certificate Course in Water and Wastewater.

The Water Industry Training Centre:

- > UTW40198 Certificate IV in Water Industry Operations.

Cuyamaca College: Water and Wastewater Technology:

The Water and Wastewater Technology Program offers short courses that are designed to prepare students for success in entering, and advancing within, the industry. The courses offered that compare well with this qualification are as follows:

- > Advanced plant operations: Water Treatment.
- > Advanced plant operations: Wastewater Treatment.
- > Calculations in Water/Wastewater Technology.
- > Introduction to electrical and Instrumentation Processes.
- > Fundamentals of Water/Wastewater Technology.
- > Laboratory analysis for Water/Wastewater.
- > Mechanical maintenance.

Scottish Vocational Qualifications (SQA):

- > SVQ Level 3 in Water Industry Operations:

SADC Region:

Searches have been conducted in the SADC region and there were no qualifications found that could compare with this qualification.

Conclusion concerning comparability:

The search has indicated that the South African qualification compares well in that a substantial degree of similarity was found in most of the qualifications examined in terms of the occupational profiles and training standards of other countries that have been investigated. Although the South African qualification combines both water and wastewater process operations due to the similarities found in the core components of both qualifications, the revised qualification provides a mix of mandatory unit standards to cover both water and wastewater core competencies and electives as optional units that enable learners to choose from to address their particular roles in their respective areas of specialization.

Hence the South African qualification and its associated unit standards is generally comparable to the Scottish, Australian, New Zealand in terms of levels, scope and range of competencies covered and slightly with the United Kingdom qualification as well although the titles of the qualifications differ.

ARTICULATION OPTIONS

This Qualification has been developed for mobility across similar trades within the industry and is intended to allow for further learning towards management certificates or diplomas within this sector or other sectors on NQF Level 5 or 6. This Qualification will provide articulation with a range of Qualifications in both technical and management areas.

MODERATION OPTIONS

- > Anyone assessing a learner against these standards must be registered as an assessor with the relevant ETQA.
- > Any institution offering learning that will enable achievement of these Unit Standards or will assess these Unit Standards must be accredited as a provider with the relevant ETQA.
- > Moderation of assessment will be overseen by the relevant ETQA according to the moderation guidelines in the relevant Qualification and the agreed ETQA procedures.
- > Therefore anyone wishing to be assessed against this Qualification may apply to be assessed by any assessment agency, assessor or provider institution that is accredited by the relevant ETQA or by any other ETQA that has signed a memorandum of understanding (MoU).

CRITERIA FOR THE REGISTRATION OF ASSESSORS

For an applicant to register as an assessor, the applicant needs:

- > A minimum of five years practical, relevant occupational experience.
- > Declared competent in all the outcomes of the generic assessor standard, and certificated by the relevant ETQA or by any other ETQA that has signed a memorandum of understanding (MoU).
- > Detailed documentary proof of educational Qualification, practical training undergone, and experience gained by the applicant must be provided (Portfolio of evidence).
- > Able to demonstrate competence in relation to these specified standards and Qualifications, at or above, the level of the Qualifications in question.
- > 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

This qualification replaces qualification 22672, "National Certificate: Wastewater Process Control", Level 4, 145 credits.

A note on the compilation of standards in this qualification in line with the SAQA principle of avoiding duplication, existing registered standards were used where possible.

UNIT STANDARDS

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Fundamental	119472	Accommodate audience and context needs in oral/signed communication	Level 3	5
Fundamental	119457	Interpret and use information from texts	Level 3	5
Fundamental	119467	Use language and communication in occupational learning programmes	Level 3	5
Fundamental	119465	Write/present/sign texts for a range of communicative contexts	Level 3	5
Fundamental	9015	Apply knowledge of statistics and probability to critically interrogate and effectively communicate findings on life related problems	Level 4	6
Fundamental	119462	Engage in sustained oral/signed communication and evaluate spoken/signed texts	Level 4	5
Fundamental	119469	Read/view, analyse and respond to a variety of texts	Level 4	5
Fundamental	9016	Represent analyse and calculate shape and motion in 2- and 3-dimensional space in different contexts	Level 4	4
Fundamental	119471	Use language and communication in occupational learning programmes	Level 4	5
Fundamental	7468	Use mathematics to investigate and monitor the financial aspects of personal, business, national and international issues	Level 4	6
Fundamental	119459	Write/present/sign for a wide range of contexts	Level 4	5
Core	254121	Demonstrate knowledge of the characteristics of water flow	Level 4	10
Core	255981	Demonstrate knowledge of the principles of water hydraulics	Level 4	6
Core	13945	Describe and apply the management of stock and fixed assets in a business unit	Level 4	2
Core	242810	Manage Expenditure against a budget	Level 4	6
Core	255976	Supervise and optimise the operation of separation processes	Level 4	8
Core	254099	Supervise personal safety practices in the workplace	Level 4	4
Core	255983	Supervise the operation of mechanical, electrical, pneumatic and hydraulic control systems	Level 4	10
Core	10981	Supervise work unit to achieve work unit objectives (individuals and teams)	Level 4	12
Core	255978	Take non-routine investigative samples for monitoring process in water and wastewater works	Level 4	8
Core	255979	Thicken and dewater sludge	Level 4	6
Core	255987	Demonstrate knowledge of water related legislation and the responsibilities of management in terms of the acts	Level 5	8
Core	14609	Participate in management of conflict	Level 5	4
Core	255975	Supervise the various disinfection and oxidation processes	Level 5	6
Elective	255985	Operate an anaerobic wastewater sludge digester	Level 3	7
Elective	255982	Control water abstraction structures	Level 4	8
Elective	255986	Demonstrate knowledge of advanced treatment of wastewater process	Level 4	8
Elective	255977	Demonstrate knowledge of the principles and application of potable water science	Level 4	8
Elective	254115	Demonstrate sound environmental practices in wastewater operations	Level 4	7
Elective	14417	Lead and supervise construction teams	Level 4	8
Elective	255984	Operate and control activated sludge process	Level 4	12
Elective	255980	Operate electronic equipment for water and wastewater process control	Level 4	6

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Elective	14426	Read, interpret and use construction drawings and specifications	Level 4	10
Elective	254118	Apply water loss control principles	Level 5	8
Elective	7818	Conduct on-the-job coaching	Level 5	5
Elective	117003	Demonstrate understanding of sections of the occupational health and safety act (act 85 of 1993) applicable to the water sector	Level 5	6

LEARNING PROGRAMMES RECORDED AGAINST THIS QUALIFICATION**None**



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:***Supervise the various disinfection and oxidation processes***

SAQA US ID	UNIT STANDARD TITLE		
255975	Supervise the various disinfection and oxidation processes		
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 5	6

This unit standard replaces:

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
115961	Operate and maintain various disinfection and oxidation processes	Level 5	6	Will occur as soon as 255975 is registered

SPECIFIC OUTCOME 1

Demonstrate knowledge of principles of oxidation and disinfection for water and wastewater treatment purposes.

SPECIFIC OUTCOME 2

Demonstrate knowledge of the operation and maintenance of the various disinfection and oxidation processes.

SPECIFIC OUTCOME 3

Monitor and control oxidant dosing.

SPECIFIC OUTCOME 4

Monitor and control oxidant storage and handling.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	61709	Further Education and Training Certificate: Water and Wastewater Treatment Process Control Supervision	Level 4



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:***Supervise and optimise the operation of separation processes***

SAQA US ID	UNIT STANDARD TITLE		
255976	Supervise and optimise the operation of separation processes		
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	8

This unit standard replaces:

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
115957	Supervise and optimise the operation of separation processes	Level 4	8	Will occur as soon as 255976 is registered

SPECIFIC OUTCOME 1

Explain the purpose and principles of separation processes.

SPECIFIC OUTCOME 2

Explain and evaluate the performance of different separation processes.

SPECIFIC OUTCOME 3

Assess the operation of separation processes in use.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	61709	Further Education and Training Certificate: Water and Wastewater Treatment Process Control Supervision	Level 4



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate knowledge of the principles and application of potable water science

SAQA US ID	UNIT STANDARD TITLE		
255977	Demonstrate knowledge of the principles and application of potable water science		
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	8

This unit standard replaces:

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
115946	Demonstrate knowledge of the principles and application of potable water science	Level 4	20	Will occur as soon as 255977 is registered

SPECIFIC OUTCOME 1

Describe the chemical characteristics of raw water.

SPECIFIC OUTCOME 2

Explain the physical characteristics of raw water.

SPECIFIC OUTCOME 3

Explain water microbiology and perform microbiological tests.

SPECIFIC OUTCOME 4

Apply water science principles to the chemical process involved in water treatment.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	61709	Further Education and Training Certificate: Water and Wastewater Treatment Process Control Supervision	Level 4



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Take non-routine investigative samples for monitoring process in water and wastewater works

SAQA US ID	UNIT STANDARD TITLE		
255978	Take non-routine investigative samples for monitoring process in water and wastewater works		
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	8

This unit standard replaces:

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
12067	Take investigative samples for monitoring process	Level 4	8	Will occur as soon as 255978 is registered

SPECIFIC OUTCOME 1

Plan the collection of investigative samples.

SPECIFIC OUTCOME 2

Undertake gas sampling.

SPECIFIC OUTCOME 3

Undertake solid sampling.

SPECIFIC OUTCOME 4

Undertake depth sampling.

SPECIFIC OUTCOME 5

Maintain sample logs.

SPECIFIC OUTCOME 6

Interpret results received from laboratory.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

ID	QUALIFICATION TITLE	LEVEL
Core 61709	Further Education and Training Certificate: Water and Wastewater Treatment Process Control Supervision	Level 4



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:**Thicken and dewater sludge**

SAQA US ID	UNIT STANDARD TITLE		
255979	Thicken and dewater sludge		
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	6

This unit standard replaces:

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
12050	Thicken and dewater sludge	Level 4	8	Will occur as soon as 255979 is registered

SPECIFIC OUTCOME 1

Demonstrate knowledge of the sludge thickening process.

SPECIFIC OUTCOME 2

Operate sludge dewatering process in accordance with work policies and procedures.

SPECIFIC OUTCOME 3

Maintain sludge dewatering/thickening plant in accordance with work procedures.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	61709	Further Education and Training Certificate: Water and Wastewater Treatment Process Control Supervision	Level 4



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:***Operate electronic equipment for water and wastewater process control***

SAQA US ID	UNIT STANDARD TITLE		
255980	Operate electronic equipment for water and wastewater process control		
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	6

This unit standard replaces:

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
12066	Operate telemetric and electronic equipment and scientific instrumentation	Level 4	12	Will occur as soon as 255980 is registered

SPECIFIC OUTCOME 1

Demonstrate knowledge of the components of an electronic measuring system.

SPECIFIC OUTCOME 2

Interpret readings from electronic equipment.

SPECIFIC OUTCOME 3

Perform basic routine maintenance for electronic equipment according to operating instructions.

SPECIFIC OUTCOME 4

Demonstrate ability to control the process manually using the SCADA system.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	61709	Further Education and Training Certificate: Water and Wastewater Treatment Process Control Supervision	Level 4



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:**Demonstrate knowledge of the principles of water hydraulics**

SAQA US ID	UNIT STANDARD TITLE		
255981	Demonstrate knowledge of the principles of water hydraulics		
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	6

This unit standard replaces:

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
12059	Demonstrate knowledge of the principles of hydraulics	Level 4	6	Will occur as soon as 255981 is registered

SPECIFIC OUTCOME 1

Explain the general principles of water hydraulics.

SPECIFIC OUTCOME 2

Explain measurement of flow.

SPECIFIC OUTCOME 3

Explain flow characteristics in pressurised lines.

SPECIFIC OUTCOME 4

Discuss flow measuring devices and their application on the plant.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	61709	Further Education and Training Certificate: Water and Wastewater Treatment Process Control Supervision	Level 4



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:**Control water abstraction structures**

SAQA US ID	UNIT STANDARD TITLE		
255982	Control water abstraction structures		
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	8

This unit standard replaces:

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
115884	Control water intakes	Level 4	8	Will occur as soon as 255982 is registered

SPECIFIC OUTCOME 1

Demonstrate knowledge of the environment in a catchment area.

SPECIFIC OUTCOME 2

Operate and maintain abstraction works.

SPECIFIC OUTCOME 3

Monitor flow rates and levels at river and levels at reservoirs.

SPECIFIC OUTCOME 4

Monitor and adjust abstraction rates at boreholes in accordance with works procedures.

SPECIFIC OUTCOME 5

Monitor abstraction point quality and conditions.

SPECIFIC OUTCOME 6

Isolate the abstraction point in emergency conditions in accordance with works procedures.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

ID	QUALIFICATION TITLE	LEVEL
Elective 61709	Further Education and Training Certificate: Water and Wastewater Treatment Process Control Supervision	Level 4



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Supervise the operation of mechanical, electrical, pneumatic and hydraulic control systems

SAQA US ID	UNIT STANDARD TITLE		
255983	Supervise the operation of mechanical, electrical, pneumatic and hydraulic control systems		
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	10

This unit standard replaces:

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
115960	Operate mechanical, electrical and hydraulic equipment and control systems	Level 4	10	Will occur as soon as 255983 is registered

SPECIFIC OUTCOME 1

Work with mechanical control equipment.

SPECIFIC OUTCOME 2

Explain electrical control systems and demonstrate emergency procedures.

SPECIFIC OUTCOME 3

Explain the flow characteristics of liquids and compressed air.

SPECIFIC OUTCOME 4

Operate hydraulic and pneumatic control systems.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	61709	Further Education and Training Certificate: Water and Wastewater Treatment Process Control Supervision	Level 4



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:**Operate and control activated sludge process**

SAQA US ID	UNIT STANDARD TITLE		
255984	Operate and control activated sludge 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	12

This unit standard replaces:

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
12056	Operate activated sludge process	Level 4	18	Will occur as soon as 255984 is registered

SPECIFIC OUTCOME 1

Identify and explain the different types of activated sludge systems.

SPECIFIC OUTCOME 2

Control activated sludge systems.

SPECIFIC OUTCOME 3

Assess activated sludge plant performance.

SPECIFIC OUTCOME 4

Operate nitrogen removal activated sludge plant.

SPECIFIC OUTCOME 5

Operate biological phosphate removal activated sludge plant.

SPECIFIC OUTCOME 6

Operate chemical phosphate removal activated sludge plant.

SPECIFIC OUTCOME 7

Control sludge carry-over.

SPECIFIC OUTCOME 8

Identify and discuss health risks and dangers associated with activated sludge process.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

ID	QUALIFICATION TITLE	LEVEL
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	ID	QUALIFICATION TITLE	LEVEL
Elective	61709	Further Education and Training Certificate: Water and Wastewater Treatment Process Control Supervision	Level 4



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Operate an anaerobic wastewater sludge digester

SAQA US ID	UNIT STANDARD TITLE		
255985	Operate an anaerobic wastewater sludge digester		
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 replaces:

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
12047	Operate an anaerobic digester	Level 4	7	Will occur as soon as 255985 is registered

SPECIFIC OUTCOME 1

Describe the anaerobic digestion process.

SPECIFIC OUTCOME 2

Stabilise sludge in compliance with standard working procedures.

SPECIFIC OUTCOME 3

Identify and explain chemical and physical characteristics of hazardous material in a wastewater treatment environment.

SPECIFIC OUTCOME 4

Monitor anaerobic digestion process.

SPECIFIC OUTCOME 5

Maintain anaerobic digester and its components in accordance with work policies and procedures.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

ID	QUALIFICATION TITLE	LEVEL
Elective 61709	Further Education and Training Certificate: Water and Wastewater Treatment Process Control Supervision	Level 4



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:***Demonstrate knowledge of advanced treatment of wastewater process***

SAQA US ID	UNIT STANDARD TITLE		
255986	Demonstrate knowledge of advanced treatment of wastewater 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	8

This unit standard replaces:

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
12069	Demonstrate knowledge of advanced treatment of wastewater process	Level 4	20	Will occur as soon as 255986 is registered

SPECIFIC OUTCOME 1

Explain biological nutrient removal (BNR) process.

SPECIFIC OUTCOME 2

Explain the importance of de-nitrification.

SPECIFIC OUTCOME 3

Explain advanced sludge treatment.

SPECIFIC OUTCOME 4

Explain chemical nutrient removal processes.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	61709	Further Education and Training Certificate: Water and Wastewater Treatment Process Control Supervision	Level 4



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate knowledge of water related legislation and the responsibilities of management in terms of the acts

SAQA US ID	UNIT STANDARD TITLE		
255987	Demonstrate knowledge of water related legislation and the responsibilities of management in terms of the acts		
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 5	8

This unit standard replaces:

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
116979	Demonstrate knowledge of water related legislation and the responsibilities of management in terms of the acts	Level 5	8	Will occur as soon as 255987 is registered

SPECIFIC OUTCOME 1

Demonstrate knowledge and understanding of the basic principles of the Act and Regulations in terms of own sector.

SPECIFIC OUTCOME 2

Explain the requirements for minimum compliance stipulated in the Acts.

SPECIFIC OUTCOME 3

Interpret the management controls required to achieve compliance.

SPECIFIC OUTCOME 4

Keep records in accordance with the requirements of the Acts and the Regulations.

SPECIFIC OUTCOME 5

Demonstrate knowledge of legislation pertaining to the quality of potable water and final effluent discharge.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

ID	QUALIFICATION TITLE	LEVEL
Core 61709	Further Education and Training Certificate: Water and Wastewater Treatment Process Control Supervision	Level 4