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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

**Power Plant Operations**

registered by Organising Field 06 – Manufacturing, Engineering and Technology, publishes the following Qualification and Unit Standard for public comment.

This notice contains the titles, fields, sub-fields, NQF levels, credits, and purpose of the Qualification and Unit Standard. The full Qualification and Unit Standard can be accessed via the SAQA web-site at [www.saq.org.za](http://www.saq.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 Standard should reach SAQA at the address below and **no later than 23 May 2008**. All correspondence should be marked **Standards Setting – SGB for Power Plant Operations** and addressed to

The Director: Standards Setting and Development  
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## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

**QUALIFICATION:****Further Education and Training Certificate: Power Plant Operations**

SAQA QUAL ID	QUALIFICATION TITLE		
61569	Further Education and Training Certificate: Power Plant Operations		
ORIGINATOR	PROVIDER		
SGB Power Plant Operations			
QUALIFICATION TYPE	FIELD	SUBFIELD	
Further Ed and Training Cert	6 - Manufacturing, Engineering and Technology	Manufacturing and Assembly	
ABET BAND	MINIMUM CREDITS	NQF LEVEL	QUAL CLASS
Undefined	130	Level 4	Regular-Unit Stds Based

**This qualification replaces:**

Qual ID	Qualification Title	NQF Level	Min Credits	Replacement Status
23735	National Certificate: Hydro Power Plant Operation	Level 4	150	Will occur as soon as 61569 is registered

**PURPOSE AND RATIONALE OF THE QUALIFICATION**

Purpose:

Learners obtaining this qualification will be able to perform operational activities on the power plant auxiliary systems/processes and related equipment as Field Operating Supervisors on all power utilities in South Africa. The qualification will ensure professionalism, proficiency and excellence in the operating of Power Plants. It will also assist in changing perceptions on the status and functional levels of operators in the work place. The qualification will provide the operators with pride and self worth and enhance their morale.

Worth to the employer will be manifested in the competence of the employee in terms of safe, sound and efficient operations performed by the operator. This qualification will provide for recognition of prior learning of existing operators' competence throughout the industry and allowed credits to be obtained in cross- functional learning fields.

The qualification will provide the foundational requirements for mobility and vertical progression into power plant control.

A person acquiring this qualification will have skills, knowledge and behavioural competence in the following areas:

- > Energy conversion process and the impact of specific plant on this process.
- > Planning and organising of own job requirements.
- > Legislation regarding safety, health and environment on the specific plant area.
- > Technical understanding of mechanical, electrical and instrumentation components.
- > Dangers of chemicals used in his/her direct work environment.
- > Lessons learned from trends/incidents related to his/her specific plant.
- > Problem solving and decision making.
- > Big picture thinking.

- > Process plant operating philosophies and configuration.
- > Communication, structures, procedures and processes.
- > Duties and responsibilities of persons within the functional area.

**Rationale:**

This qualification is based on the industry needs in building competencies in the workplace for Power Plant Operators. The qualification therefore sets national standards for field operators on power plant operations.

This qualification is a direct outcome of the revision of the FETC: Power Plant Operations, NQF Level 4 suite of qualifications ID: 23735, 23678 and ID: 23733 the demand for which is based on the transformation of the existing qualifications into a qualification with specializations that meets the needs of the relevant industry, supporting the principles of the NQF and providing the flexibility of bridging into a management type of qualification with a strong customer focus.

This qualification aims at providing formal recognition for competencies already obtained and will continue to do so by providing recognition to workers in the Power Plant Operations Industry. In addition, this qualification provides the learner with the opportunity to obtain competencies in the various power plant operations within the workplace, as well as in power plant operations safety and quality control. In this way, value is added to worker's employability and competence and the sustainability of the power plant operations industry is improved.

This qualification provides the learner with accessibility primarily to be employed within the functional areas of the various power plant operations but does not exclude horizontal movement to other power utilities.

Other considerations in the national interest addressed by this qualification are:

- > Setting national standards of practice in this specific learning field.
- > Building individual capacity in this specialised profession.
- > Ensuring entry, progression and mobility into Life Long Learning in this specific learning field.
- > Addressing Power Plant Operations Industry specific employment requirements.
- > Enhancing of professional competence on a national level.
- > Providing an avenue of upliftment for the previously disadvantaged into this professional discipline.
- > Providing a qualification to be used in a learnership in this field.
- > Enhancing social and economic development.

**RECOGNIZE PREVIOUS LEARNING?**

Y

**LEARNING ASSUMED IN PLACE**

It is assumed that learners are already competent in:

- > Communication and Mathematical Literacy, NQF Level 3.
- > Computer Literacy, NQF Level 3.

**Recognition of Prior Learning (RPL):**

- > This qualification can be achieved in part or whole through recognised RPL processes.
- > Evidence of prior learning must be assessed through formal RPL processes through recognised methods.
- > Any other evidence of prior learning should be assessed through formal RPL processes to recognise achievement thereof.

#### Access to the Qualification:

Access to the qualification is open to any learner with a related NQF Level 3 technical qualification. However, it is preferable that learners have completed:

- > National Certificate: Power Plant Auxiliary Systems Operations, NQF Level 3.

#### **QUALIFICATION RULES**

- > 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 are compulsory.

- > All the Core Unit Standards totalling 12 Credits are compulsory.
- > Learners are to choose an Elective specialization area and complete the unit standards specific for each specialization.

#### Specialization Area 1: Hydro Power Plant Operations:

Choose unit standards totalling a minimum of 62 credits from the Elective Unit Standards listed below:

- > 14217: Operate bulk lubrication oil systems, NQF Level 3, 5 Credits.
- > 14212: Operate hydro generator cooling system, NQF Level 4, 4 Credits.
- > 14216: Operate hydro generator plant bearing systems, NQF Level 4, 2 Credits.
- > 10900: Operate hydro power generation common cooling water, NQF Level 4, 4 Credits.
- > 13633: Operate hydro power generation drainage and dewatering systems, NQF Level 4, 4 Credits.
- > 13638: Operate hydro power generation station plants - emergency standby electrical systems, NQF Level 4, 2 Credits.
- > 14211: Operate hydro power generation transformer auxiliary systems, NQF Level 4, 4 Credits.
- > 13673: Operate hydro power generation turbine plant main pump and/or turbine system, NQF Level 4, 5 Credits.
- > 14213: Operate hydro power generator mechanical brake and jacking system, NQF Level 4, 3 Credits.
- > 14215: Operate hydro power generator starting and braking devices, NQF Level 4, 4 Credits.
- > 13652: Operate hydro turbine plant bearing systems, NQF Level 4, 7 Credits.
- > 13666: Operate hydro turbine plant blow down air system, NQF Level 4, 4 Credits.
- > 13645: Operate hydro turbine plant cooling water system, NQF Level 4, 4 Credits.
- > 13664: Operate hydro turbine plant governing systems, NQF Level 4, 4 Credits.
- > 13658: Operate hydro turbine plant main inlet valve system, NQF Level 4, 4 Credits.
- > 13665: Operate hydro turbine plant shaft sealing system, NQF Level 4, 2 Credits.

Total: 62 Credits.

**Specialization Area 2: Fossil Power Plant Operations:**

Choose unit standards totalling a minimum of 102 credits from the Elective Unit Standards listed below:

- > 14898: Operate fossil fired steam generator and combustion air and flue gas systems, NQF Level 4, 8 Credits.
- > 14905: Operate fossil fired steam generator auxiliary systems, NQF Level 4, 9 Credits.
- > 255896: Operate fossil fired steam generator fuel firing system, NQF Level 4, 13 Credits.
- > 14896: Operate fossil fired steam generator water and steam system, NQF Level 4, 11 Credits.
- > 14880: Operate steam turbine feedwater storage, heating and pumping systems, NQF Level 4, 12 Credits.
- > 14881: Operate steam turbine steam systems, NQF Level 4, 10 Credits.
- > 13724: Operate turbo-generator auxiliary systems, NQF Level 4, 3 Credits.
- > 13721: Operate turbo-generator cooling systems, NQF Level 4, 12 Credits.
- > 13720: Operate turbo-generator oil systems, NQF Level 4, 9 Credits.
- > 242755: Demonstrate knowledge and understanding of power plant auxiliary systems, NQF Level 4, 9 Credits.
- > 14903: Operate fossil fired steam generator spray water system, NQF Level 4, 2 Credits.
- > 11944: Operate steam turbine condensate system, NQF Level 4, 8 Credits.
- > 14059: Operate steam turbine condenser air evacuation systems, NQF Level 4, 6 Credits.
- > 14037: Demonstrate knowledge and understanding of heat exchange equipment used in a process plant, NQF Level 3, 2 Credits.
- > 10574: Demonstrate knowledge of Steam Generator design and application, NQF Level 3, 6 Credits.
- > 14065: Demonstrate knowledge of steam turbines design and application, NQF Level 3, 6 Credits.

Total: 126 Credits.

**Specialization Area 3: Nuclear Power Plant Operations:**

Choose unit standards totalling a minimum of 107 credits from the Elective Unit Standards listed below:

- > 14126: Demonstrate knowledge of steam turbines design and application, NQF Level 4, 6 Credits.
- > 13705: Describe fundamental instrumentation and measurement equipment associated with nuclear power plant, NQF Level 4, 3 Credits.
- > 13706: Describe fundamental material science related to brittle fracture and vessel thermal stress in nuclear power plants, NQF Level 4, 3 Credits.
- > 13710: Explain thermodynamic principles and concepts as applied in nuclear power generating plant, NQF Level 4, 9 Credits.
- > 14115: Operate nuclear reactor coolant and support systems, NQF Level 4, 5 Credits.
- > 13798: Operate nuclear reactor fire extinguishing systems, NQF Level 4, 2 Credits.
- > 13728: Operate nuclear reactor refuelling water systems, NQF Level 4, 3 Credits.
- > 14116: Operate nuclear reactor safeguard systems, NQF Level 4, 3 Credits.
- > 13794: Operate nuclear reactor vent and drain systems, NQF Level 4, 3 Credits.
- > 13801: Operate radioactive gaseous waste handling systems, NQF Level 4, 3 Credits.
- > 13727: Operate radioactive liquid waste treatment and handling systems, NQF Level 4, 17 Credits.
- > 11944: Operate steam turbine condensate system, NQF Level 4, 8 Credits.
- > 14059: Operate steam turbine condenser air evacuation systems, NQF Level 4, 6 Credits.

- > 14880: Operate steam turbine feedwater storage, heating and pumping systems, NQF Level 4, 12 Credits.
- > 14881: Operate steam turbine steam systems, NQF Level 4, 10 Credits.
- > 14107: Operate support plant diesel systems, NQF Level 4, 2 Credits.
- > 13724: Operate turbo-generator auxiliary systems, NQF Level 4, 3 Credits.
- > 13721: Operate turbo-generator cooling systems, NQF Level 4, 12 Credits.
- > 13720: Operate turbo-generator oil systems, NQF Level 4, 9 Credits.
- > 14217: Operate bulk lubrication oil systems, NQF Level 3, 5 Credits.
- > 14119: Operate nuclear auxiliary cooling systems, NQF Level 3, 15 Credits.
- > 13723: Operate turbo-generator fire extinguishing system on a nuclear power plant, NQF Level 3, 2 Credits.

Total: 139 Credits.

### **EXIT LEVEL OUTCOMES**

1. Solve complex problems in a variety of contexts.
2. Communicate effectively in the workplace.
3. Explain and apply supervisory concepts related to power plant operations.
4. Demonstrate knowledge of regulatory requirements associated with power plant operations.
5. Operate Hydro Turbine Generator processes and associated equipment within safe operating parameters.

### **Critical Cross-Field Outcomes (CCFOs):**

This qualification promotes, in particular, the following Critical Cross-Field Outcomes:

Identifying and solving problems in which responses display that responsible decisions using critical and creative thinking have been made when:

- > Identifying and developing component shapes for a power plant activity.
- > Obtaining information where instructions or information on drawings is insufficient.
- > Identifying and pro-actively reporting on non-availability of resources and materials.

Working effectively with others as a member of a team, group, organisation, and community during:

- > Activities involving clients, co-workers and other trades on site.
- > Communicating and receiving advice from supervisor.

Organising and managing oneself and one's activities responsibly and effectively when:

- > Setting out the work area and preparing to fabricate and install components.
- > Performing activities in accordance with industry standards.
- > Selecting power plant tools and equipment in accordance with the requirements of the task.
- > Ensuring tools, equipment and power plant materials are securely stored.
- > Maintaining minimum quantities of plumbing materials in accordance with task requirements.
- > Selecting and preparing safety equipment and clothing in accordance with legislative requirements.

Collecting, analysing, organising and critically evaluating information to better understand and explain by:

- > Carrying out written site instructions issued by the client, correctly and efficiently.
- > Correctly interpreting information contained in drawings.
- > Setting out work areas from provided control positions and levels in accordance with instructions and drawings.

Communicating effectively using visual, mathematical and/or language skills in the modes of oral and/or written persuasion when:

- > Issuing clear verbal instructions to team members.
- > Actively listening to feedback received from team members.
- > Evaluating and reporting problem situations to the client.

Using science and technology effectively and critically, showing responsibility towards the environment and health of others when:

- > Applying the appropriate tools and materials for different power plant activities.

Demonstrating an understanding of the world as a set of related systems by recognising that problem-solving contexts do not exist in isolation when:

- > Applying the inter-relatedness of the fabrication and installation of components to power plant systems.

#### **ASSOCIATED ASSESSMENT CRITERIA**

Associated Assessment Criteria for Exit Level Outcome 1:

1. Problems are identified using definitive techniques.
2. Problem solving strategies are dealt with according to hydro power plant operation procedures.
3. Root causes are identified and solutions derived and are applied to solve problems.
4. Problem solving approach is communicated in a clear and structured manner using appropriate terminology.
5. Solutions are validated in terms of the problem solving process.
6. Technology is used effectively to assist in problem solving.

Associated Assessment Criteria for Exit Level Outcome 2:

1. Language structure and features are applied effectively to accommodate workplace requirements.
2. Appropriate media is used to communicate in a clear and structured manner.
3. Media used for communications contributes to effective communication.
4. Communication barriers are identified and addressed as appropriate to the situation.
5. Text in written and oral communication is interpreted against set standards.

Associated Assessment Criteria for Exit Level Outcome 3:

1. The role of self management practices is explained within the context of transformational leadership.
2. Leadership attributes are integrated to meet the strategic intent within the organisation.
3. Understanding of leadership concepts contributes to the safe, efficient and effective operation of power plants.

Associated Assessment Criteria for Exit Level Outcome 4:

1. Regulatory requirements in workplace procedures are described and interpreted within the context of the Occupational Health and Safety Act.
2. Non-compliance to statutory requirements is described in terms of the potential impact on the micro environment.
3. Interrelations between related regulatory requirements are described in terms of standard operating procedures.

**Associated Assessment Criteria for Exit Level Outcome 5:**

1. Plant operations are performed according to operating standards.
2. Out of normal emergency conditions are identified and acted upon using Power Plant Engineering Principles.
3. Interrelation of Hydro Systems is interpreted and contextualised within Power Generation.
4. Principles of teamwork are applied according to operational requirements.

**Integrated Assessment:**

The applied competence (practical, foundational and reflective competencies) of this qualification will be achieved if a learner is able to achieve the exit level outcomes of the qualification as per the rules specified. Applicable critical cross field outcomes must be assessed during any combination of practical, foundational and reflexive competencies assessment methods and tools to determine the whole person development and integration of applied knowledge and skills.

Certain exit level outcomes are measurable and verifiable through assessment criteria assessed in one application Applicable assessment tools to assess the foundational, reflective and practical competencies within the power plant operations environment.

A detailed portfolio of evidence is required of the practical, foundational and reflective competencies of the learner Assessors and moderators should develop and conduct integrated assessment by making use of a range of formative and summative methods.

Assessors should assess and give credit for the evidence of learning that has already been acquired (RPL) through any form of learning Unit standards associated with this qualification must be used to assess Specific and Critical Cross-Field Outcomes.

During integrated assessment, the assessor should make use of formative and summative assessment methods and should assess combinations of practical, foundational and reflective competencies.

**Formative Assessment:**

Assessment criteria for formative assessment are described in the various unit standards. Formative assessment takes place during the process of learning and assessors should use a range of appropriate assessment methods and tools that assesses competence holistically.

These methods include but not limited to the following:

- > On-the-job observations.
- > Role-play and/or simulations.
- > Knowledge tests, exams, case studies, projects, logbooks, workbooks.
- > Verbal report backs (presentations).
- > Portfolios of evidence (RPL).
- > Working in teams (360 degrees evaluations).
- > Scenario sketching Incident reports.



The assessment tools and methods used by the assessor must be:

- > Fair, not to hinder or disadvantage the learner in any way.
- > Valid, to measure what is intended to measure.
- > Reliable, consistent and delivers the same output across a range of learners and assessors.

**Summative Assessment:**

Summative assessment is carried out at the end of each meaningful competence level achieved by the learner. A detailed portfolio of evidence is required to prove the practical, foundational and reflective competencies of the learner.

**Assessors and Moderators:**

Work place assessors should develop and conduct integrated assessments by using appropriate methods and techniques. Moderation to be done according to laid down requirements.

### **INTERNATIONAL COMPARABILITY**

**Introduction:**

The Nuclear Power Plant qualifications are based on a study conducted by the Power Plant Standards Generating Body working groups on the qualifications available in various countries with leading power producers. From the countries reviewed it was concluded that the UK model (with minor changes) was the most applicable to the South African context and as such was used as the basis for these outline of the qualifications

This qualification was further reviewed and developed taking into account the USA training programmes and content. A final review was done to ensure that it meets the SAQA requirements for registration.

In South Africa there are a number of Hydro Power stations as well as two Pump Storage Schemes. The training and development of hydro operators and controllers take place in South Africa where a number of these utilities have been benchmarked against EPRI standards.

Hydro Operator Training in Sub-Saharan Africa is provided at Kafue Gorge Regional Training Centre which was funded by the Norwegian Government. A number of short courses are offered where candidates from the following countries are trained: Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, Zambia, Zimbabwe, Namibia, Mauritius, Uganda and Kenya.

**Benchmark Background:**

The USA has the most utilities and structured training programmes but they do not have a structured national qualifications network similar to the NQF, however, the same principles apply as far as analysis, design, development and evaluation of the training programmes is concerned.

The USA nuclear industry standard is governed by the NRC (Nuclear Regulatory Commission). The standard of training is ensured by accrediting all training programmes to requirements as set out and evaluated by Institute of Nuclear Power Operations (INPO). The Systematic Approach to Training (SAT) is applied throughout all the US nuclear programmes resulting in a structured training curriculum (task list) consisting of main objectives and specific outcomes similar to the core and electives as laid out in this qualification.

The tasks are given a rating based on knowledge and ability required to perform the task and from this the frequency of the training is determined. The task list does not have credits coupled to the learning components.

INPO award accreditation status to a utility based on documented proof of the training programmes meeting the INPO standard. The accreditation status gets renewed every four years based on an evaluation report compiled by an audit team and presented at an accreditation board meeting.

INPO award recognition to the candidates completing the nuclear training programmes in a similar fashion by awarding a certificate once an accredited programme is completed by a learner.

It can be concluded that although not the same, the INPO practices are similar to the principles applicable to this qualification.

The core elements are the same for a similar type nuclear facility. The main difference is seen in the elective and fundamental elements. Major differences noted are soft skills and generic fossil elements are not covered in the INPO task list. The USA takes credit for the elective and fundamental elements in the national education system.

Benchmark Matrix: Nuclear Power Plant Operations:

SA:

Criteria:

- > Utility: Eskom.
- > Roles: Operator - Controller.
- > Framework levels: 1-7.
- > NQF/NVQ Levels: 3 - 6.
- > Credits Total: 882.
- > Accreditation/Quality Assurance: SETA, INPO/WANO, IAEA.
- > Entry Level: NQF Level 3.
- > Operators in fields: 1250.
- > Number of Unit Standards: 174.

USA:

Criteria:

- > Utility: Westinghouse, Exelon, WANO, Entergy, Dominion.
- > Roles: Operator - Controller.
- > Framework levels: N/A.
- > NQF/NVQ Levels: N/A.
- > Credits: N/A.
- > Accreditation/Quality Assurance: INPO/WANO.
- > Entry Level: N/A.
- > Operators in fields: N/A.
- > Number of Unit Standards: +- 140.

UK:

Criteria:

- > Utility: British Energy.
- > Roles: Operator - Controller.
- > Framework levels: 1 - 5.

- > NQF/NVQ Levels: 2 - 3.
- > Credits: N/A.
- > Accreditation/Quality Assurance: C&G/ETA.
- > Entry Level: NVQ Level 1.
- > Operators in fields: N/A.
- > Number of Unit Standards: 18.

Matrix Information:

Utility:

Internationally the USA has the most utilities and the best structured training programmes. It is recommended that the USA should be utilised as the main country to benchmark nuclear qualifications against. The main differences encountered were the fact that the USA does not have a National structured qualification framework similar to South Africa.

The South African training programme content was developed, implemented and maintained in accordance with their nuclear training programmes. The programmes were found to be well developed and tested to meet the industry demand and SAQA requirements.

In terms of the qualification model completeness, the UK model was the one chosen and eventually used as a benchmark.

Roles:

The role of Operator is defined as the person performing duties as a field operator. The role of Controller is the person controlling integrated, interrelated processes from a control room. The only country using the operator to perform maintenance duties is Germany. In the nuclear field the maintenance duties are normally not performed by the operating staff but by specialist maintenance personnel.

Framework Levels:

Qualifications obtained in this learning field for Nuclear, Fossil and Hydro Power Plants consist of five certificates, three diplomas and one first degree.

NQF/NVO and credit levels:

NQF Level 3 - 209 credits, NQF Level 4 - 293 credits and NQF Level 5 - 380 credits.

Accreditation/Quality Assurance:

In South Africa with Eskom as the only Nuclear utility, Koeberg power station achieved a fully fledged INPO accreditation. Quality in terms of best practices is assured worldwide by the International Organisation, World Association of Nuclear Operators (WANO).

In conclusion it was decided that in terms of the qualification model completeness, the UK model was regarded as the best to benchmark this qualification against, with the content of the United States of America (USA) qualifications also playing a prominent role in it.

### **ARTICULATION OPTIONS**

This qualification provides the learner with the flexibility to pursue different careers in the power generation industry. The level of flexibility within the range of elective utilities (hydro, nuclear, fossil and electrical control) will allow the individual to pursue further learning within those development areas.

This Qualification allows for both horizontal and vertical articulation.

Vertical Articulation can occur with:

- > ID 61570: National Diploma: Power Plant Process Control Operations, Level 5.

Horizontal Articulation can occur with:

- > ID 48978: Further Education Training Certificate: Electrical Network Control.
- > ID 23733: Further Education Training Certificate: Nuclear Power Plant Operations.
- > ID 23735: Further Education Training Certificate: Hydro Power Plant Operations.
- > ID 23678: Further Education Training Certificate: Fossil Power Plant Operations.

#### **MODERATION OPTIONS**

- > Anyone assessing a learner or moderating the assessment of a learner against this Qualification must be registered as an assessor with the relevant ETQA.
- > Any institution offering learning that will enable the achievement of this Qualification 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.
- > A learner wishing to be assessed for this Qualification can only be assessed through an accredited assessment provider/centre.

#### **CRITERIA FOR THE REGISTRATION OF ASSESSORS**

The assessor must be:

- > Registered as an assessor with the relevant ETQA.
- > Have at least a minimum of 1 year on the job relevant experience.
- > Have a similar qualification above the level of the qualification.

#### **NOTES**

This qualification replaces qualification 23735, "National Certificate: Hydro Power Plant Operation", Level 4, 150 credits.

Computer literacy, where applicable must cover topics concerning word processing, spreadsheets and electronic mail, according to the learning assumed to have taken place section.

#### **UNIT STANDARDS**

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Fundamental	119472	Accommodate audience and context needs in oral/signed communication	Level 3	5
Fundamental	119458	Analyse and respond to a variety of literary texts	Level 3	5
Fundamental	119466	Interpret a variety of literary texts	Level 3	5
Fundamental	119457	Interpret and use information from texts	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

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Core	14062	Demonstrate Knowledge of Safe Entry into Prohibited and/ or Restricted Areas	Level 3	2
Core	13600	Demonstrate knowledge of regulatory requirements for permit to work systems	Level 5	10
Elective	14063	Apply Self Management through the Concepts of Positive Self-esteem and Resiliency	Level 3	2
Elective	14037	Demonstrate knowledge and understanding of heat exchange equipment used in a process plant	Level 3	2
Elective	10574	Demonstrate knowledge of Steam Generator design and application	Level 3	6
Elective	14065	Demonstrate knowledge of steam turbines design and application	Level 3	6
Elective	14217	Operate Bulk Lubrication Oil Systems	Level 3	5
Elective	14119	Operate nuclear auxiliary cooling systems	Level 3	15
Elective	13723	Operate turbo-generator fire extinguishing system on a nuclear power plant	Level 3	1
Elective	14064	Understand Constructive Thinking	Level 3	12
Elective	14061	Understand Management Practices	Level 3	7
Elective	14060	Understand transformational leadership	Level 3	5
Elective	14060	Understand transformational leadership	Level 3	5
Elective	242755	Demonstrate knowledge and understanding of power plant auxiliary systems	Level 4	9
Elective	14126	Demonstrate knowledge of steam turbines design and application	Level 4	6
Elective	13705	Describe fundamental instrumentation and measurement equipment associated with nuclear power plant	Level 4	3
Elective	14903	Operate Fossil Fired Steam Generator Spray Water System	Level 4	2
Elective	14896	Operate Fossil Fired Steam Generator Water and Steam System	Level 4	11
Elective	14898	Operate Fossil Fired Steam Generator and Combustion Air and Flue Gas Systems	Level 4	8
Elective	14216	Operate Hydro Generator Plant Bearing Systems	Level 4	2
Elective	14215	Operate Hydro Power Generator Starting and Braking Devices	Level 4	4
Elective	14215	Operate Hydro Power Generator Starting and Braking Devices	Level 4	4
Elective	11944	Operate Steam Turbine Condensate System	Level 4	8
Elective	14059	Operate Steam Turbine Condenser Air Evacuation Systems	Level 4	6
Elective	14880	Operate Steam Turbine Feedwater Storage, Heating and Pumping Systems	Level 4	12
Elective	14881	Operate Steam Turbine Steam Systems	Level 4	10
Elective	14107	Operate Support Plant Diesel Systems	Level 4	2
Elective	13724	Operate Turbo-Generator Auxiliary Systems	Level 4	3
Elective	13721	Operate Turbo-Generator Cooling Systems	Level 4	12
Elective	13720	Operate Turbo-Generator Oil Systems	Level 4	9
Elective	255896	Operate fossil fired steam generator for fuel firing system	Level 4	13
Elective	14212	Operate hydro generator cooling system	Level 4	4
Elective	10900	Operate hydro power generation common cooling water	Level 4	4
Elective	13633	Operate hydro power generation drainage and dewatering systems	Level 4	4
Elective	13638	Operate hydro power generation station plants - Emergency standby electrical systems	Level 4	2
Elective	14211	Operate hydro power generation transformer auxiliary systems	Level 4	4
Elective	13673	Operate hydro power generation turbine plant main pump and/or turbine system	Level 4	5
Elective	14213	Operate hydro power generator mechanical brake and jacking system	Level 4	3
Elective	13652	Operate hydro turbine plant bearing systems	Level 4	7
Elective	13666	Operate hydro turbine plant blow down air system	Level 4	4
Elective	13645	Operate hydro turbine plant cooling water system	Level 4	4
Elective	13664	Operate hydro turbine plant governing systems	Level 4	4
Elective	13658	Operate hydro turbine plant main inlet valve system	Level 4	4
Elective	13665	Operate hydro turbine plant shaft sealing system	Level 4	2
Elective	14115	Operate nuclear reactor coolant and support systems	Level 4	15

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Elective	13798	Operate nuclear reactor fire extinguishing systems	Level 4	1
Elective	13728	Operate nuclear reactor refueling water systems	Level 4	3
Elective	14116	Operate nuclear reactor safeguard systems	Level 4	3
Elective	13794	Operate nuclear reactor vent and drain systems	Level 4	3
Elective	13801	Operate radioactive gaseous waste handling systems	Level 4	3
Elective	13727	Operate radioactive liquid waste treatment and handling systems	Level 4	17

**LEARNING PROGRAMMES RECORDED AGAINST THIS QUALIFICATION****None**



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

## UNIT STANDARD:

*Operate fossil fired steam generator for fuel firing system*

<b>SAQA US ID</b>		<b>UNIT STANDARD TITLE</b>	
255896		Operate fossil fired steam generator for fuel firing system	
<b>ORIGINATOR</b>		<b>PROVIDER</b>	
SGB Power Plant Operations			
<b>FIELD</b>		<b>SUBFIELD</b>	
6 - Manufacturing, Engineering and Technology		Manufacturing and Assembly	
<b>ABET BAND</b>	<b>UNIT STANDARD TYPE</b>	<b>NQF LEVEL</b>	<b>CREDITS</b>
Undefined	Regular	Level 4	13

*This unit standard replaces:*

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
14901	Operate Fossil Fired Steam Generator for Fuel Firing System	Level 4	13	Will occur as soon as 255896 is registered

**SPECIFIC OUTCOME 1**

Prepare plant for service and monitor start up conditions.

**SPECIFIC OUTCOME 2**

Monitor and sustain plant and or equipment operability during normal running conditions.

**SPECIFIC OUTCOME 3**

Stabilise transient conditions.

**SPECIFIC OUTCOME 4**

Isolate shutdown plant.

**SPECIFIC OUTCOME 5**

Preserve plant for storage.

**SPECIFIC OUTCOME 6**

Demonstrate knowledge and understanding.

**QUALIFICATIONS UTILISING THIS UNIT STANDARD**

	ID	QUALIFICATION TITLE	LEVEL
Elective	61569	Further Education and Training Certificate: Power Plant Operations	Level 4