

No. 444

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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 title, field, sub-field, NQF level, 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.saqqa.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
SAQA

Attention: Mr. D. Mphuthing

Postnet Suite 248

Private Bag X06

Waterkloof

0145

or faxed to 012 – 431-5144

e-mail: dmphuthing@saqa.org.za

PP 
DR. S. BHIKHA

DIRECTOR: STANDARDS SETTING AND DEVELOPMENT



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:**National Certificate: Power Plant Auxiliary Systems Operations**

| SAQA QUAL ID | | QUALIFICATION TITLE | |
|----------------------------|---|--|-------------------------|
| 61549 | | National Certificate: Power Plant Auxiliary Systems Operations | |
| ORIGINATOR | | PROVIDER | |
| SGB Power Plant Operations | | | |
| QUALIFICATION TYPE | FIELD | SUBFIELD | |
| National Certificate | 6 - Manufacturing, Engineering and Technology | Manufacturing and Assembly | |
| ABET BAND | MINIMUM CREDITS | NQF LEVEL | QUAL CLASS |
| Undefined | 120 | Level 3 | Regular-Unit Stds Based |

This qualification replaces:

| Qual ID | Qualification Title | NQF Level | Min Credits | Replacement Status |
|---------|---|-----------|-------------|---|
| 23677 | National Certificate: Power Plant Auxiliary Systems Operation | Level 3 | 122 | Will occur as soon as 61549 is registered |

PURPOSE AND RATIONALE OF THE QUALIFICATION

Purpose:

Learners obtaining this qualification will be able to perform operational activities on power plant auxiliary systems/processes and related equipment as Field Operators on all power utilities in South Africa. The qualification will ensure professionalism, proficiency and excellence in the operating of power plants on the entry level. 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 allow credits to be obtained in cross-functional learning fields. The qualification will provide the foundational requirements for mobility and vertical progression in various power utilities, (Fossil, Hydro or Nuclear).

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

- > Energy conversion process.
- > Theories and application of mechanical, electrical and process instrumentation.
- > Regulatory knowledge (OHSA, Introduction to High Voltage Regulations, Permit to Work Systems).
- > Dangers of chemicals used on power plants.
- > Planning, Organizing, Decision Making, Big Picture Thinking skills at a micro level.
- > Process plant configuration and integration.
- > Self management.
- > Team work.

- > Communication (written and verbal).
- > Problem solving.
- > Process plant operation in one of Fossil, Nuclear or Hydro Plants.

Rationale:

This qualification forms the foundation for Power Plant Operations in the Power Generation industry in South Africa and is therefore recommended for all Power utilities. This qualification is based on industry needs in building competences in the workplace for power plant operations. The qualification therefore sets national standards for power plant operators in Auxiliary Plant Operations. This qualification provides the learner with accessibility to be employed within the functional areas that include nuclear, hydro and fossil power plants.

This qualification is a direct outcome of the revision of the National Certificate in Power Plant Auxiliary Systems Operations, NQF Level 3, ID. No. 23677 the demand for which was based on the transformation of the existing qualification into a qualification 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 power plant operations within the workplace, as well as in power plant 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.

Other considerations in national interest addressed by this qualification are:

- > Setting the national standards of practice in this specific learning field building individual capacity in foundational operating competence.
- > 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 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 competent in:

- > Communication and Mathematical Literacy at NQF Level 2.
- > General Science, Technology and Mathematics at NQF Level 2 or Grade 10 Level.

Recognition of Prior Learning:

- > This qualification can be achieved in part or whole through recognised RPL learning 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 2 qualification and who complies with the learning assumed to be in place.

QUALIFICATION RULES

- > All the Fundamental Unit Standards totalling 36 credits are compulsory.
- > All the Core Unit Standards totalling 48 credits are compulsory.
- > Choose the required credits in the Elective Unit Standards component in the Specialisation area to make up the requirements of the full qualification.
- > Learners are to choose an elective specialization area and complete the required number of unit standards listed for that specialization area.

Specialization Area 1: Fossil Power Plant Operations:

Learners must choose unit standards totalling a minimum of 51 credits from the Elective Unit Standards listed below:

- > ID 14037 Demonstrate knowledge and understanding of heat exchange equipment used in a process plant, 2 credits.
- > ID 10522 Interpret solid transfer system theories in a process plant, 2 credits.
- > ID 114462 Operate bulk flue gas conditioning systems on fossil fired steam generators, 5 credits.
- > ID 114458 Operate bulk fuel oil systems, 8 credits.
- > ID 14217 Operate bulk lubrication oil systems, 5 credits.
- > ID 114456 Operate coal handling systems, 11 credits.
- > ID 114465 Operate compressed air systems, 8 credits.
- > ID 12096 Operate demineralized water systems on fossil power plants, 4 credits.
- > ID 12023 Operate hydrogen production plants, 9 credits.
- > ID 114459 Operate liquid petroleum gas systems on fossil power plants, 2 credits.
- > ID 13726 Operate support plant compressed air systems, 8 credits.
- > ID 11957 Operate waste handling systems associated with power plant processes, 16 credits.
- > ID 13708 Apply engineering principles related to the operation of demineralizers and ion exchangers in nuclear power generating plant, 3 credits.
- > ID 12095 Operate potable water systems, 2 credits.
- > ID 13713 Operate support plant water supply systems, 2 credits.

Specialization Area 2: Nuclear Power Plant Operations:

Learners must choose unit standards totalling a minimum of 79 credits from the Elective Unit Standards listed below:

- > ID 14037 Demonstrate knowledge and understanding of heat exchange equipment used in a process plant, 2 credits.
- > ID 10522 Interpret solid transfer system theories in a process plant, 2 credits.
- > ID 14217 Operate bulk lubrication oil systems, 5 credits.
- > ID 114465 Operate compressed air systems, 8 credits.
- > ID 12096 Operate demineralized water systems on fossil power plants, 4 credits.
- > ID 12023 Operate hydrogen production plants, 9 credits.
- > ID 114459 Operate liquid petroleum gas systems on fossil power plants, 2 credits.
- > ID 13726 Operate support plant compressed air systems, 8 credits.
- > ID 13708 Apply engineering principles related to the operation of demineralizers and ion exchangers in nuclear power generating plant, 3 credits.
- > ID 12095 Operate potable water systems, 2 credits.
- > ID 13713 Operate support plant water supply systems, 2 credits.
- > ID 13712 Operate nuclear liquid waste monitoring and discharge systems, 4 credits.
- > ID 13711 Operate nuclear support plant gas production and supply systems, 3 credits.

- > ID 114455 Operate nuclear support plant steam production system, 2 credits.
- > ID 13959 Operate nuclear support plant chlorination system, 2 credits.
- > ID 114469 Operate nuclear support plant water supply systems, 2 credits.
- > ID 13709 Apply fundamental reactor engineering principles and theories related to nuclear power generating plant, 12 credits.
- > ID 13707 Describe the operation and application of electrical equipment as required for nuclear power plant, 3 credits.
- > ID 13725 Operate support plant electrical systems, 7 credits.
- > ID 14113 Operate support plant fire extinguishing systems, 2 credits.
- > ID 14102 Apply radiation requirements for activities in radiologically controlled zones at a nuclear power plant, 2 credits.
- > ID 13726 Operate support plant compressed air systems, 8 credits.

Specialization Area 3: Hydro Power Plant Operations:

Learners must choose unit standards totalling a minimum of 36 credits from the Elective Unit Standards listed below:

- > ID 14037 Demonstrate knowledge and understanding of heat exchange equipment used in a process plant, 2 credits.
- > ID 13704 Demonstrate knowledge and understanding of hydro power, 15 credits.
- > ID 10522 Interpret solid transfer system theories in a process plant, 2 credits.
- > ID 114465 Operate compressed air systems, 8 credits.
- > ID 13726 Operate support plant compressed air systems, 8 credits.
- > ID 13708 Apply engineering principles related to the operation of demineralizers and ion exchangers in nuclear power generating plant, 3 credits.
- > ID 12095 Operate potable water systems, 2 credits.
- > ID 13713 Operate support plant water supply systems, 2 credits.
- > ID 13729 Operate Ventilation systems, 3 credits.

EXIT LEVEL OUTCOMES

1. Solve problems in a variety of contexts.
2. Communicate effectively in the workplace.
3. Demonstrate fundamental knowledge of Power Plant Engineering.
4. Apply safety measures in the workplace.
5. Operate Auxiliary Power Plant Systems.

Critical Cross-Field Outcomes:

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.
- > 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. Problem solving strategies to deal with problems at hand are applied in accordance with auxiliary systems procedures.
2. Solutions derived at are applied to solve problems.
3. Problem solving approach is communicated in a clear and structured manner using appropriate terminology.
4. Solutions are validated in terms of the problem solving process.
5. Technology is used effectively to assist in problem solving.

Associated Assessment Criteria for Exit Level Outcome 2:

1. Language is applied to accommodate workplace requirements.
2. Communication is clear and structured as per the situation at hand.
3. Media used for communications contributes to effective communication.

4. Communication barriers are identified and addressed as appropriate to the situation.

Associated Assessment Criteria for Exit Level Outcome 3:

1. Power plant engineering concepts are explained and applied within the context of plant operations.
2. Applications of knowledge are suited for problem solving on process plant.
3. Explanations provided of Power Plant Engineering concepts are consistent with established literature and engineering conventions.
4. Applications of knowledge contribute towards the safe and effective operation of plant processes.

Associated Assessment Criteria for Exit Level Outcome 4:

1. Organisational understanding is demonstrated to an extent that the employee can function effectively in the workplace.
2. Safety principles are applied in a holistic manner that protects plant and people.

Associated Assessment Criteria for Exit Level Outcome 5:

1. Plant operations are performed safely and efficiently according to operating standards.
2. Out of normal emergency conditions are identified and acted upon using Power Plant Engineering Principles.
3. Interrelation of Auxiliary Systems are 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 all 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 used must determine the whole persons 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 by Recognition of Prior Learning (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 assess competence holistically.

These methods include but are 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 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 met the SAQA requirements for registration.

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 programs 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; Level 1-7.
- > NQF/NVQ; Levels 3 - 6.
- > Credits; Total 882 credits.
- > Accreditation/Quality Assurance; SETA, INPO/WANO IAEA.
- > Entry Level; NQF 3 Level.
- > 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; N/A.
- > Credits; N/A.
- > Accreditation/Quality Assurance; INPO/WANO.
- > Entry Level; N/A.
- > Operators in fields; Not available.
- > Number of Unit Standards; +- 140.

UK:

Criteria:

- > Utility; British Energy.
- > Roles; Operator-Controller.
- > Framework Levels; Level 1-5.
- > NQF/NVQ; Levels 2 - 3.
- > Credits; N/A.
- > Accreditation/Quality Assurance; C&G/ETA.
- > Entry Level; NVQ 1.
- > Operators in fields; Not available.
- > 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 the 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 levels and credits:

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 48978, Further Education and Training Certificate: Electrical Network Control.
- > ID 23735, Further Education and Training Certificate: Hydro Power Plant Operations.
- > ID 23733, Further Education and Training Certificate: Nuclear Power Plant Operations.
- > ID 23678, Further Education and Training Certificate: Fossil Power Plant Operations.
- > ID 61569, Further Education and Training Certificate: Power Plant Operations.

Horizontal Articulation can occur with:

> ID 48475, National Certificate: Electrical Engineering, Level 3.

MODERATION OPTIONS

> Anyone assessing a learner or moderating the assessment of a learner against this Qualification must be registered 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 policies and guidelines for assessment and moderation; in terms of agreements reached around assessment and moderation between ETQA's (including professional bodies); and in terms of the moderation guideline.

> 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 relevant practical experience.
- > Have a similar qualification above the level of the qualification.

NOTES

This qualification replaces qualification 23677, "National Certificate: Power Plant Auxiliary Systems Operation", Level 3, 122 credits.

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 | 13963 | Demonstrate Knowledge and Understanding Towards Occupational health and safety Regulatory Requirements | Level 2 | 2 |
| Core | 13962 | Demonstrate Knowledge and Understanding of The Organisation | Level 2 | 2 |
| Core | 13961 | Demonstrate Knowledge and Use of Hand Operated Fire Fighting Equipment | Level 2 | 4 |
| Core | 10195 | Apply Engineering Principles and concepts in a Power Generation Process Plant | Level 3 | 5 |
| Core | 10585 | Describe bearing types, designs and application theories associated with process plants | Level 3 | 2 |
| Core | 10582 | Describe lubrication methods and applications associated with process plants | Level 3 | 2 |

| | ID | UNIT STANDARD TITLE | LEVEL | CREDITS |
|----------|--------|--|---------|---------|
| Core | 14036 | Describe plant instrumentation and process measurement used on Power Generation plant | Level 3 | 3 |
| Core | 10613 | Describe power transmission designs and application theories associated with process plants | Level 3 | 3 |
| Core | 10587 | Describe the working principle of compressed air systems associated with process plant | Level 3 | 2 |
| Core | 10598 | Differentiate between valve designs and application theories associated with process plants | Level 3 | 1 |
| Core | 10488 | Interpret liquid transfer theories in a process plant | Level 3 | 3 |
| Core | 14038 | Interpret the operation of internal combustion engines used in power plants | Level 3 | 3 |
| Core | 114463 | Operate Cooling Water Systems | Level 3 | 11 |
| Core | 255974 | Operate fire water systems on fossil power plants | Level 3 | 3 |
| Core | 13703 | Perform operational communicational activities | Level 3 | 2 |
| Elective | 114464 | Operate nuclear reactor building air lock system | Level 2 | 2 |
| Elective | 14102 | Apply Radiation Requirements for Activities in Radiologically Controlled Zones at a Nuclear Power Plant | Level 3 | 2 |
| Elective | 13704 | Demonstrate knowledge and understanding of Hydro power generation concepts and theories | Level 3 | 15 |
| Elective | 14037 | Demonstrate knowledge and understanding of heat exchange equipment used in a process plant | Level 3 | 2 |
| Elective | 10522 | Interpret solid transfer system theories in a process plant | Level 3 | 2 |
| Elective | 14217 | Operate Bulk Lubrication Oil Systems | Level 3 | 5 |
| Elective | 114465 | Operate Compressed Air Systems | Level 3 | 8 |
| Elective | 12096 | Operate Demineralised Water Systems on Fossil Power Plants | Level 3 | 4 |
| Elective | 114469 | Operate Nuclear Support Plant Water Supply Systems | Level 3 | 1 |
| Elective | 13713 | Operate Support Plant Water Supply Systems | Level 3 | 1 |
| Elective | 11957 | Operate Waste Handling Systems Associated with Power Plant Processes | Level 3 | 16 |
| Elective | 114462 | Operate bulk flue gas conditioning systems on fossil fired steam generators | Level 3 | 5 |
| Elective | 114458 | Operate bulk fuel oil systems | Level 3 | 8 |
| Elective | 114456 | Operate coal handling systems | Level 3 | 11 |
| Elective | 12023 | Operate hydrogen production plants | Level 3 | 9 |
| Elective | 114459 | Operate liquid petroleum gas systems on fossil power plants | Level 3 | 1 |
| Elective | 13712 | Operate nuclear liquid waste monitoring and discharge systems | Level 3 | 4 |
| Elective | 13711 | Operate nuclear support plant gas production and supply systems | Level 3 | 3 |
| Elective | 114455 | Operate nuclear support plant steam production system | Level 3 | 2 |
| Elective | 13959 | Operate nuclear support plant system chlorination system | Level 3 | 1 |
| Elective | 13726 | Operate support plant compressed air systems | Level 3 | 8 |
| Elective | 13708 | Apply engineering principles related to the operation of demineralisers and ion exchangers in nuclear power generating plant | Level 4 | 3 |
| Elective | 13709 | Apply fundamental reactor engineering principles and theories related to nuclear power generating plant | Level 4 | 12 |
| Elective | 13707 | Describe the operation and application of electrical equipment as required for nuclear power plant | Level 4 | 3 |
| Elective | 13725 | Operate Support Plant Electrical Systems | Level 4 | 7 |
| Elective | 14113 | Operate support plant fire extinguishing systems | Level 4 | 2 |

LEARNING PROGRAMMES RECORDED AGAINST THIS QUALIFICATION

None



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Operate fire water systems on fossil power plants

| SAQA US ID | | UNIT STANDARD TITLE | |
|---|--------------------|---|---------|
| 255974 | | Operate fire water systems on fossil power plants | |
| ORIGINATOR | | PROVIDER | |
| SGB Power Plant Operations | | | |
| FIELD | | SUBFIELD | |
| 6 - Manufacturing, Engineering and Technology | | Manufacturing and Assembly | |
| ABET BAND | UNIT STANDARD TYPE | NQF LEVEL | CREDITS |
| Undefined | Regular | Level 3 | 3 |

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

SPECIFIC OUTCOME 1

Prepare plant for service.

SPECIFIC OUTCOME 2

Startup and monitor startup conditions.

SPECIFIC OUTCOME 3

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

SPECIFIC OUTCOME 4

Stabilise transient conditions.

SPECIFIC OUTCOME 5

Shut down plant.

SPECIFIC OUTCOME 6

Isolate shutdown plant.

SPECIFIC OUTCOME 7

Demonstrate knowledge and understanding of regulatory requirements.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

| ID | QUALIFICATION TITLE | LEVEL |
|------------|--|---------|
| Core 61549 | National Certificate: Power Plant Auxiliary Systems Operations | Level 3 |