No. 442 **25 April 2008**

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 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.saqa.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 than 23 May 2008.*** All correspondence should be marked **Standards Setting – SGB for Power Plant Operations** and addressed to

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SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:
National Diploma: Power Plant Process Control Operations

SAQA QUAL ID	*QUALIFICATION TITLE*		
61570	National Diploma: Power Plant Process Control Operations		
ORIGINATOR		*PROVIDER*	
SGB Power Plant Operations			
QUALIFICATION TYPE	*FIELD*	*SUBFIELD*	
National Diploma	6 - Manufacturing, Engineering and Technology	Manufacturing and Assembly	
ABET BAND	*MINIMUM CREDITS*	*NQF LEVEL*	*QUAL CLASS*
Undefined	241	Level 5	Regular-Unit Stds Based

This qualification replaces:

Qual ID	Qualification Title	NQF Level	Min Credits	Replacement Status
23679	National Diploma: Fossil Power Plant Process Control	Level 5	248	Will occur as soon as 61570 is registered
23734	National Diploma: Nuclear Power Plant Process Control	Level 5	295	Will occur as soon as 61570 is registered
23736	National Diploma: Hydro Power Plant Process Control	Level 5	241	Will occur as soon as 61570 is registered

PURPOSE AND RATIONALE OF THE QUALIFICATION
Purpose:

Learners obtaining this qualification will be recognised on a national level for performing process control activities on a power plant. This qualification will ensure professionalism, proficiency and excellence in the control of Power Plant Generation Units. It will also assist in changing perceptions on the status and functional levels of process controllers in Power Plant Generation. The qualification will provide the incumbents with pride, 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 process controller. This qualification will provide standards for recognition of prior learning of existing process controller competence throughout the industry and allow credits to be obtained in cross-functional learning fields.

On acquiring this qualification they will have skills, knowledge and behavioural competence to perform the following:

> To objectively recognise what is happening in or across situations with people, plant and materials.
> To recognise the direct impact of decisions and actions and the effects on plant and people in the direct work environment.
> To decide upon the most appropriate action after problems were recognised, analysed and the options evaluated.
> To listen, question, observe, describe accurately and align with the senders' needs.
> To order resources, ideas, events, people and plant to enable required events, to operate at organisation and system level.

> To know the energy flow through the conversion process and the key conversion process concepts are understood.
> To know the theory of application of mechanical, electrical and instrumentation plant components and their interrelationship to the plant is known and understood.
> To know Interrelated plant processes and safety equipment are operated and controlled safely and efficiently.
> To complete and process relevant documentation correctly according to operating procedures, service notifications and authorisation requirements.
> The trends / incidents related to the specific plant are understood.
> Concepts, terms and theory of the specified technical field as for the prescribed subjects are known.
> To control the operation of the plant to stay within the set limits for environmental impact.
> Process chemistry fundamentals applicable to the process plant and the implications of operating outside of chemical specifications are known and understood.
> To train and control subordinates in their adherence to the Regulations.
> To lead staff in accordance with the organization's purpose, values and vision.
> To utilize the computer to manage / control the plant processes and analyse plant and conditions.
> Production targets by planning, organising, leading and controlling of staff, and motivating and influencing their behaviour create effective working relationships.

Rationale:

This qualification is designed for learners who will be responsible for controlling integrated processes on a specific Power Plant from remote located control centres.

This qualification is based on the power generation industry needs in building competence in the workplace for the specific Power Plant Process Control Operations. The qualification therefore sets national standards for Power Plant Control Operators in a specific Power Plant Process Control Operations environment.

This qualification is a direct outcome of the revision of the ND: Power Plant Operations, NQF Level 5 suite of qualifications with ID. No. 23679, 23734 and 23736 the demand for which was 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 qualification with a strong customer focus.

This qualification provides the learner with accessibility to be employed within the process control function on a specific Power Plant Unit.

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

> Setting national standards of practice in these specific learning fields building individual capacity in these specialized professions.
> Ensuring entry, progression and mobility into Life Long Learning in these specific learning fields addressing Power Plant Operations.
> Adhering to 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 qualifications to be used in learnerships in these fields.
> 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 4.
> Computer Literacy, NQF Level 4.
> Electrical Engineering Fundamentals, NQF Level 3 with the following unit standards:
> ID 10893: Demonstrate knowledge and understanding of electrical power generation.
> ID 14204: Interpret basic electronic theories in Power Plant Process Control.
> ID 10894: Interpret electrical circuits.
> ID 10677: Interpret electrical theories.
> ID 10719: Understand the operating principles of transformers.
> ID 10707: Understanding the principles of magnetism.

Recognition of Prior Learning:

> These qualifications will be achieved in part or in whole through the 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 is open to all learners in possession of an FETC or equivalent NQF Level 4 qualification. It is preferable that learners have completed the:

> FETC: Power Plant Operations.

QUALIFICATION RULES
> All the Fundamental Unit Standards totalling 27 credits are compulsory.

> All the Core Unit Standards totalling 81 credits are compulsory.

> Learners are to choose an Elective Specialization and complete the required unit standards as designated for each specialization.

Specialization Area 1: Hydro Power Plant Process Control Operations:

Choose unit standards totalling a minimum of 145 credits from the Elective Unit Standards listed below:

> ID 13519: Control Load Variation on a Hydro Power Generating Unit in Pumping Mode from a Control Room; NQF Level 5; 4 Credits.
> ID 13520: Control Load Variations on a Hydro Power Generating Unit in Generating and Synchronous Compensation Mode from a Control Room; NQF Level 5; 4 Credits.
> ID 13523: Monitor and Sustain Plant Operability of a Hydro Power Generating Unit from the Control Room; NQF Level 5; 7 Credits.
> ID 13525: Monitor and Sustain Plant Operability on Hydro Power Generation Auxiliary Systems from Control Centres; NQF Level 5; 10 Credits.
> ID 10899: Shutdown Hydro Power Generation Auxiliary Systems from Control Centres; NQF Level 5; 10 Credits.
> ID 13521: Shutdown Hydro Power Generation Unit from a Control Room; NQF Level 5; 12 Credits.
> ID 13526: Stabilise Out of Normal and or Emergency Condition on Hydro Power Generation Unit from a Control Room; NQF Level 5; 15 Credits.
> ID 13527: Stabilise Out of Normal and or Emergency Conditions on Hydro Power Generation Auxiliary Systems; NQF Level 5; 11 Credits.

> ID 13517: Start-up Hydro Power Generating Auxiliary Systems from Control Centres; NQF Level 5; 13 Credits.
> ID 10898: Start-up Hydro Power Generating Unit from a Control Room; NQF Level 5; 32 Credits.
> ID 14053: Demonstrate Knowledge Of Corrosion Control; NQF Level 5; 7 Credits.
> ID 116434: Control electrical networks from a control centre; NQF Level 4; 10 Credits.
> ID 116453: Perform operations on high voltage integrated systems; NQF Level 4; 4 Credits.
> ID 14057: Demonstrate knowledge and understanding of electrical systems and related concepts; NQF Level 4; 6 Credits.

Total Elective Credit Component = 145 Credits.

Specialization Area 2: Fossil Power Plant Process Control Operations:

Choose unit standards totalling a minimum of 133 credits from the Elective Unit Standards listed below:

> ID 14057: Demonstrate knowledge and understanding of electrical systems and related concepts; NQF Level 4; 6 Credits.
> ID 14055: Understand water chemistry in a power plant environment; NQF Level 4; 3 Credits.
> ID 13562: Control load variation on a fossil fired steam generator from a control room; NQF Level 5; 7 Credits.
> ID 13596: Control load variations on a fossil fired power generation unit from a control room; NQF Level 5; 9 Credits.
> ID 13564: Control load variations on a steam driven turbo-generator from a control room; NQF Level 5; 6 Credits.
> ID 13572: Monitor and Sustain Plant Operability of a Steam Driven Turbo-Generator System from a Control Room; NQF Level 5; 7 Credits.
> ID 255874: Demonstrate Knowledge and Understanding of Pulverised Fuel Firing Regulations (PFFR) as applied on fossil fired power generating plants; NQF Level 5; 3 Credits.
> ID 14053: Demonstrate Knowledge Of Corrosion Control; NQF Level 5; 7 Credits.
> ID 13566: Shut down a fossil fired steam generator from a control room; NQF Level 5; 12 Credits.
> ID 13597: Shutdown a fossil fired power generating unit from a control room; NQF Level 5; 22 Credits.
> ID 13568: Shutdown a steam driven turbo-generator system from a control room; NQF Level 5; 11 Credits.
> ID 13599: Stabilise Out of Normal Emergency Conditions on a Fossil Fired Power Generating Unit from a Control Room; NQF Level 5; 28 Credits.
> ID 13573: Stabilise Out of Normal Emergency Conditions on a Fossil Fired Steam Generator from a Control Room; NQF Level 5; 15 Credits.
> ID 13575: Stabilise Out of Normal Emergency Conditions on a Steam Driven Turbo-Generator System from a Control Room; NQF Level 5; 12 Credits.
> ID 13558: Start up a fossil fired steam generator from a control room; NQF Level 5; 32 Credits.
> ID 13561: Start up a Steam Driven Turbo-Generator from a Control Room; NQF Level 5; 21 Credits.
> ID 255895: Start up a fossil fired power generating unit from a control room; NQF Level 5; 55 Credits.
> ID 13571: Monitor and Sustain Plant Operability on a Fossil Fired Steam Generator from a Control Room; NQF Level 5; 8 Credits.
> ID 255894: Monitor and sustain plant operability on a fossil fired power generating unit from a control room; NQF Level 5; 16 Credits.

Total Fossil Power Credits = 280 Credits.

Specialization Area 3: Nuclear Power Plant Process Control Operations:

Choose unit standards totalling a minimum of 198 credits from the Elective Unit Standards listed below:

> ID 13816: Control Load Variations on a Nuclear Steam Supply Plant from a Control Room; NQF Level 5; 11 Credits.
> ID 13817: Control Load Variations on a Turbo-Generator Plant from a Control Room; NQF Level 5; 7 Credits.
> ID 14907: Describe the Regulatory Nuclear Safety requirements as applied in nuclear power generating plant; NQF Level 5; 2 Credits.
> ID 14227: Monitor and Sustain Nuclear Steam Supply Plant from a Control Room; NQF Level 5; 5 Credits.
> ID 13572: Monitor and Sustain Plant Operability of a Steam Driven Turbo-Generator System from a Control Room; NQF Level 5; 7 Credits.
> ID 14232: Preserve Nuclear Steam Supply Plant; NQF Level 5; 4 Credits.
> ID 14233: Preserve Steam Driven Turbo-Generator Plant; NQF Level 5; 4 Credits.
> ID 13819: Shutdown a Nuclear Steam Supply Plant from a Control Room; NQF Level 5; 26 Credits.
> ID 13568: Shutdown a steam driven turbo-generator system from a control room; NQF Level 5; 11 Credits.
> ID 14230: Stabilise Out of Normal and or Emergency Condition on a Nuclear Steam Supply Plant from a Control Room; NQF Level 5; 57 Credits.
> ID 14231: Stabilise Out of Normal and or Emergency Conditions on Nuclear Power Plant Turbo Generating Unit; NQF Level 5; 6 Credits.
> ID 13804: Start up Nuclear Steam Supply Plant from a Control Room; NQF Level 5; 32 Credits.
> ID 13811: Start up Turbo-Generator Plant from a Control Room; NQF Level 5; 14 Credits.
> ID 16434: Control electrical networks from a control centre; NQF Level 4; 10 Credits.
> ID 16453: Perform operations on high voltage integrated systems; NQF Level 4; 4 Credits.
> ID 13710: Explain thermodynamic principles and concepts as applied in nuclear power generating plant; NQF Level 4; 9 Credits.
> ID 13706: Describe fundamental material science related to brittle fracture and vessel thermal stress in nuclear power plants; NQF Level 4; 3 Credits.

Total Nuclear Power Credits = 212 Credits.

EXIT LEVEL OUTCOMES

1. Demonstrate understanding of leadership concepts related to the function of first line supervision.

2. Demonstrate understanding of the fundamentals of Power Plant Engineering Concepts related to the control of power generating units.

3. Demonstrate knowledge of regulatory requirements associated with the control of power plant generating units.

4. Control power generating processes within safe operating parameters.

5. Perform continuous improvement activities on Power Plant Processes.

Critical Cross-Field Outcomes:

This qualification addresses the following Critical Cross-Field Outcomes, as detailed in the assessment criteria for each exit level outcome and within the unit standards associated with each exit level outcome:

> Identifying and solving problems in which responses indicate that responsible decisions using critical and creative thinking have been made.
> Working effectively with others as a member of a group, organisation or community.
> Organising and managing oneself and one's activities responsibly and effectively.
> Collecting, analysing, organising and critically evaluating information.
> Communicating effectively using visual, mathematical and/or language skills in the modes of oral/written persuasion.
> Using science and technology effectively and critically, showing responsibility towards the environment and health of others.
> Demonstrating and understanding of the world as a set of related systems by recognising that problem-solving contexts do not exist in isolation.
> Learning programmes directed towards this qualification will also contribute to the full personal development of each learner and the social and economic development of the society at large, by making individuals aware of the importance of:
> Reflecting on and exploring a variety of strategies to learn more effectively.
> Participating as responsible citizens in the life of local, national and global communities.
> Being culturally and aesthetically sensitive across a range of social contexts.
> Exploring education and career opportunities; and developing entrepreneurial opportunities.

ASSOCIATED ASSESSMENT CRITERIA
Associated Assessment Criteria for Exit Level Outcome 1:

> The role of self-management is described within the context of first line supervision.
> The role of management practices is explained within the context of first line supervision.
> Leadership attributes are integrated to meet the strategic intent within the organisation.
> Understanding of leadership concepts contributes to the safe, efficient and effective control of power plants.

Associated Assessment Criteria for Exit Level Outcome 2:

> Knowledge is demonstrated of the application of power plant engineering concepts within the context of power plant process control operations.
> Applications of knowledge are suited for solving control problems in the process plant.
> Equipment design and application theories are described within the context of their application.
> Thermal and cycle efficiency are interpreted correctly within power generating processes.
> Knowledge is demonstrated of the technology associated with the control of power generating plants.
> Theories related to the generation of electricity and related apparatus are interpreted within the context of their application.
> Water treatment principles are described within power plant thermal processes.
> Explanations provided of Power Plant Engineering concepts are consistent with established literature and engineering conventions.
> Applications of knowledge contribute towards the safe and effective control of power plant processes.

Associated Assessment Criteria for Exit Level Outcome 3:

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

Associated Assessment Criteria for Exit Level Outcome 4:

> Plant operations and control activities are performed according to operating standards.
> Out of normal emergency conditions are identified and acted upon using Power Plant Engineering Principles.
> Interrelation of Steam and Turbo generator processes are interpreted and contextualised within a Power Generating unit.
> Teamwork activities are facilitated to meet operational requirements.
> Power generating processes are controlled to meet system demand.
> Thermal efficiency attained meets design specifications.
> Tasks assigned to respective staff meet operational requirements.

Associated Assessment Criteria for Exit Level Outcome 5:

> Corrective actions identified and suggested for improvement of activities on Power Plant Processes.
> Corrective actions disseminated to appropriate individuals.
> Corrective actions implemented to improve quality of activities on Power Plant Processes.

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 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 control 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 the range of formative and summative methods.
> Assessors should assess and give credit for the evidence of learning that has already been acquired 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 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 competence level to assess the achievement of 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 adopted 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 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:

Criteria; SA; USA; UKL:

> Utility; Eskom; Westinghouse, Exelon, WANO, Entergy, Dominion; British Energy.
> Roles; Operator-Controller; Operator-Controller; Operator-Controller.
> Framework Levels; 1-7; n/a; 1-5.
> NQF/NVQ levels; 3-6; n/a; 2-3.
> Credits; Total 882; n/a; n/a.
> Accreditation/Quality Assurance; SETA, INPO/WANO, IAEA; INPO/WANO; C&G/ETA.
> Entry level; NQF 3; n/a; NVQ 1.
> Operators in Fields; 1250; Not available; Not available.
> Number of Unit Standards; 174; +-140; 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, 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 vertical articulation with:

> Bachelors Degree: Power Plant Process Management, Level 6.

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's policies and guidelines for assessment and moderation; in terms of agreements reached around assessment and moderation between ETQA's (including professional bodies).

> A learner wishing to be assessed for this Qualification can 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 the following qualifications:
> 23736, "National Diploma: Hydro Power Plant Process Control", Level 5, 241 credits;
> 23679, "National Diploma: Fossil Power Plant Process Control Operations", Level 5, 248 credits;
> 23734, "National Diploma: Nuclear Power Plant Process Control Operations", Level 5, 295 credits.

Computer Literacy where applicable must cover topics concerning word processing, spreadsheets and electronic mail.

UNIT STANDARDS

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Fundamental	14041	Demonstrate Knowledge and Understanding of the Electrical Technology Associated with the Control of Electrical Energy on a Power Generating Unit in the Power Plant	Level 5	6
Fundamental	242766	Demonstrate knowledge and understanding of operating regulations for high voltage systems	Level 5	8

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Fundamental	114470	Demonstrate knowledge and understanding of thermal efficiency in a power plant	Level 5	3
Fundamental	13600	Demonstrate knowledge of regulatory requirements for permit to work systems	Level 5	10
Core	14048	Apply Self Management Concepts	Level 4	3
Core	14045	Apply Transformational Leadership by Interacting with Key Stakeholders	Level 4	8
Core	116407	Control frequency and voltages in an Islanding condition on electrical networks	Level 4	6
Core	116084	Demonstrate an understanding of the Principles of Process Control Loops	Level 4	10
Core	14056	Demonstrate knowledge and understanding of earthing practices on alternating current power systems	Level 4	2
Core	14058	Describe instrumentation control within a process control system	Level 4	9
Core	10897	Explain transformer characteristics applied on power systems	Level 4	2
Core	120377	Identify, suggest and implement corrective actions to improve quality of project work	Level 4	7
Core	13803	Phasing and or synchronising on high voltage intergrated systems	Level 4	3
Core	10689	Understand electrical protection systems associated with power generating processes	Level 4	6
Core	10933	Understand the principles of alternating current (AC) motor operation and application in a process plant	Level 4	5
Core	14049	Understands, Applies and Displays Constructive Thinking	Level 4	5
Core	115753	Conduct outcomes-based assessment	Level 5	15
Elective	116434	Control electrical networks from a control centre	Level 4	10
Elective	14057	Demonstrate knowledge and understanding of electrical systems and related concepts	Level 4	6
Elective	254096	Demonstrate knowledge of corrosion control	Level 4	6
Elective	13706	Describe fundamental material science related to brittle fracture and vessel thermal stress in nuclear power plants	Level 4	3
Elective	13710	Explain thermodynamic principles and concepts as applied in nuclear power generating plant	Level 4	9
Elective	116453	Perform operations on high voltage integrated systems	Level 4	4
Elective	14055	Understand water chemistry in a power plant environment	Level 4	3
Elective	13806	Code a web page layout	Level 5	4
Elective	13519	Control Load Variation on a Hydro Power Generating Unit in Pumping Mode from a Control Room	Level 5	4
Elective	13520	Control Load Variations on a Hydro Power Generating Unit in Generating and Synchronous Compensation Mode from a Control Room	Level 5	4
Elective	13816	Control Load Variations on a Nuclear Steam Supply Plant from a Control Room	Level 5	11
Elective	13817	Control Load Variations on a Turbo-Generator Plant from a Control Room	Level 5	7
Elective	13562	Control load variation on a fossil fired steam generator from a control room	Level 5	7
Elective	13596	Control load variations on a fossil fired power generation unit from a control room	Level 5	9
Elective	13564	Control load variations on a steam driven turbo-generator from a control room	Level 5	6
Elective	255874	Demonstrate knowledge and understanding of Pulverised Fuel Firing Regulations (PFFR) as applied on fossil fired power generating plants	Level 5	3
Elective	14907	Describe the Regulatory Nuclear Safety requirements as applied in nuclear power generating plant	Level 5	1
Elective	14227	Monitor and Sustain Nuclear Steam Supply Plant from a Control Room	Level 5	5
Elective	13523	Monitor and Sustain Plant Operability of a Hydro Power Generating Unit from the Control Room	Level 5	7
Elective	13572	Monitor and Sustain Plant Operability of a Steam Driven Turbo-Generator System from a Control Room	Level 5	7
Elective	13525	Monitor and Sustain Plant Operability on Hydro Power Generation Auxiliary Systems from Control Centres	Level 5	10

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Elective	13571	Monitor and Sustain Plant Operability on a Fossil Fired Steam Generator from a Control Room	Level 5	8
Elective	255894	Monitor and sustain plant operability on a fossil fired power generating unit from a control room	Level 5	16
Elective	14232	Preserve Nuclear Steam Supply Plant	Level 5	4
Elective	14233	Preserve Steam Driven Turbo-Generator Plant	Level 5	4
Elective	13566	Shut down a fossil fired steam generator from a control room	Level 5	12
Elective	10899	Shutdown Hydro Power Generation Auxiliary Systems from Control Centres	Level 5	10
Elective	13521	Shutdown Hydro Power Generation Unit from a Control Room	Level 5	12
Elective	13819	Shutdown a Nuclear Steam Supply Plant from a Control Room	Level 5	26
Elective	13597	Shutdown a fossil fired power generating unit from a control room	Level 5	22
Elective	13568	Shutdown a steam driven turbo-generator system from a control room	Level 5	11
Elective	13599	Stabilise Out of Normal Emergency Conditions on a Fossil Fired Power Generating Unit from a Control Room	Level 5	28
Elective	13573	Stabilise Out of Normal Emergency Conditions on a Fossil Fired Steam Generator from a Control Room	Level 5	15
Elective	13575	Stabilise Out of Normal Emergency Conditions on a Steam Driven Turbo-Generator System from a Control Room	Level 5	12
Elective	13526	Stabilise Out of Normal and or Emergency Condition on Hydro Power Generation Unit from a Control Room	Level 5	15
Elective	14230	Stabilise Out of Normal and or Emergency Condition on a Nuclear Steam Supply Plant from a Control Room	Level 5	57
Elective	13527	Stabilise Out of Normal and or Emergency Conditions on Hydro Power Generation Auxiliary Systems	Level 5	11
Elective	14231	Stabilise Out of Normal and or Emergency Conditions on Nuclear Power Plant Turbo Generating Unit	Level 5	6
Elective	13804	Start up Nuclear Steam Supply Plant from a Control Room	Level 5	32
Elective	13811	Start up Turbo-Generator Plant from a Control Room	Level 5	14
Elective	13517	Startup Hydro Power Generating Auxiliary Systems from Control Centres	Level 5	13
Elective	10898	Startup Hydro Power Generating Unit from a Control Room	Level 5	32
Elective	13561	Startup a Steam Driven Turbo-Generator from a Control Room.	Level 5	21
Elective	255895	Startup a fossil fired power generating unit from a control room	Level 5	55
Elective	13558	Startup a fossil fired steam generator from a control room	Level 5	32

LEARNING PROGRAMMES RECORDED AGAINST THIS QUALIFICATION
None

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate knowledge and understanding of Pulverised Fuel Firing Regulations (PFFR) as applied on fossil fired power generating plants

SAQA US ID	*UNIT STANDARD TITLE*		
255874	Demonstrate knowledge and understanding of Pulverised Fuel Firing Regulations (PFFR) as applied on fossil fired power generating plants		
ORIGINATOR		*PROVIDER*	
SGB Power Plant Operations			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 5	3

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

SPECIFIC OUTCOME 1
Explain pulverised fuel firing regulations.

SPECIFIC OUTCOME 2
Explain and apply requirements for start-up and firing of pulverised fuel fired boilers.

SPECIFIC OUTCOME 3
Describe regulatory requirements for normal running and shutdown of pulverised fuel fired boilers.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	61570	National Diploma: Power Plant Process Control Operations	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Monitor and sustain plant operability on a fossil fired power generating unit from a control room

SAQA US ID	*UNIT STANDARD TITLE*		
255894	Monitor and sustain plant operability on a fossil fired power generating unit from a control room		
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 5	16

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

SPECIFIC OUTCOME 1
Control service activities on integrated plant systems.

SPECIFIC OUTCOME 2
Monitor interrelated plant conditions from a central control room.

SPECIFIC OUTCOME 3
Record and report data.

SPECIFIC OUTCOME 4
Demonstrate knowledge and understanding of fossil fired power generator units monitoring and service activities.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	61570	National Diploma: Power Plant Process Control Operations	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Startup a fossil fired power generating unit from a control room

SAQA US ID	*UNIT STANDARD TITLE*		
255895	Startup a fossil fired power generating unit from a control room		
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 5	55

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

SPECIFIC OUTCOME 1
Prepare plant for startup (Plant processes and control room).

SPECIFIC OUTCOME 2
Startup plant from a control room.

SPECIFIC OUTCOME 3
Monitor startup conditions (During all specific outcomes on this unit standard).

SPECIFIC OUTCOME 4
Loading of production unit.

SPECIFIC OUTCOME 5
Inventory Control.

SPECIFIC OUTCOME 6
Optimise startup conditions.

SPECIFIC OUTCOME 7
Demonstrate knowledge and understanding of fossil fired power generating units, startup requirements and conditions.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	61570	National Diploma: Power Plant Process Control Operations	Level 5