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CONTENTS • INHOUD

GOVERNMENT NOTICES

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

No. 327 **27 March 2009**

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

Forestry

registered by Organising Field 01 – Agriculture and Nature Conservation, publishes the following Qualifications and Unit Standards for public comment.

This notice contains the titles, fields, sub-fields, NQF levels, credits, and purpose of the Qualifications and Unit Standards. The full Qualifications 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 Qualifications and Unit Standards should reach SAQA at the address below and ***no later than 27 April 2009.*** All correspondence should be marked **Standards Setting – SGB for Forestry** and addressed to

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D. MPHUTHING
ACTING DIRECTOR: STANDARDS SETTING AND DEVELOPMENT

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:
Further Education and Training Certificate: Roof Truss Technology

SAQA QUAL ID	*QUALIFICATION TITLE*		
66370	Further Education and Training Certificate: Roof Truss Technology		
ORIGINATOR		*PROVIDER*	
SGB Forestry			
QUALIFICATION TYPE	*FIELD*	*SUBFIELD*	
Further Ed and Training Cert	1 - Agriculture and Nature Conservation	Forestry and Wood Technology	
ABET BAND	*MINIMUM CREDITS*	*NQF LEVEL*	*QUAL CLASS*
Undefined	131	Level 4	Regular-Unit Stds Based

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

PURPOSE AND RATIONALE OF THE QUALIFICATION
Purpose:

The purpose of this qualification is to provide entry level and foundational competencies in the area of roof truss technology. The qualification enables the qualifying person with integrated competencies, in various contexts, workplace, learning and education to:

> Interpret a roof plan in order to estimate quantities for roof design in compliance with client expectations and legislative requirements.
> Demonstrate knowledge of roof truss technology, concepts and required solutions to interpret roof design for estimation.
> Interface with the client to determine and confirm client needs.

The qualification seeks to address an existing gap in the wood processing sector for reasons of consistency and standardization within the occupational context. It addresses the need for persons wanting to acquire the roof truss estimation qualification.

Qualifying learners will be able to:

> Establish client requirements and gather and apply required design information.
> Use a GUI-based word processor to enhance a document through the use of tables and columns.
> Develop and maintain effective working relationship with clients.
> Process roof layout documents in a compliant manner.
> Apply knowledge of roof terminology and concepts.
> Identify structural material required for a roof design.
> Explain the dynamic interaction of the various elements to a functional roof structure.
> Recommend material best suited for roof design within context.
> Calculate pitch, height and span using trigonometric equations.
> Demonstrate knowledge of industry legislation, the various stakeholders, their responsibilities, and compliance requirements.
> Interpret roof design for a roof solution.
> Estimate the quantity of material required for roof design.
> Apply problem solving strategies.

Rationale:

Roof estimation for roof design purposes is a specialised occupation within the forestry and wood processing subfield. There is currently a high demand for competent persons at this level (NQF Level 4) to address the need for roof estimation personnel for the various sectors that make use of this competence. This includes building construction persons, roof designers and manufacturers and wood processing agents and public clients in need of the various roof solutions.

This qualification serves as a foundational base and an entry point for the next level: roof design. Roof design is at NQF Level 5.

The roof estimation competence is designed for persons who have achieved grade 11 and or an equivalent qualification, (NCV) with maths and science. This includes persons at the workplace with the equivalent workplace and life experience.

This qualification enables qualifying persons to acquire all the foundational competencies in, mainly, the various knowledge areas of legislation, the various roof estimation practices, sector and or specific roof estimation norms and standards and key mathematical concepts and applications (calculations).

It is foundational in nature as it introduces the learner, worker or RPL person to the basic concepts that will enable the learner to practice as a roof estimator.

The key requirement is a reasonable level of Mathematical Literacy and related concepts that will enable the qualifying person to deal with challenges of scale, height, angles, span and estimation.

This qualification allows for access to previously disadvantaged persons to the profession through RPL by means of matching the relevant work and life experience with the requirements of the relevant unit standard. The NQF principles (portability, progression) will be realized through the articulation path suggested for the qualification.

It is through this qualification that the needs of the various stakeholders, mentioned above, will be met.

RECOGNIZE PREVIOUS LEARNING?
Y

LEARNING ASSUMED IN PLACE
This qualification assumes that learners are already competent in:

> Communication and Mathematical Literacy at NQF Level 3.

Recognition of Prior Learning:

This qualification can be achieved wholly or in part through Recognition of Prior Learning.

Whether a learner attends formal courses or acquires the required skills through informal means, the same standards apply as per the matrix of unit standards and Exit Level Outcomes. The qualification and the standards have been written in such a way that the learning has to be assessed in an integrated way. Assessors will assess evidence to establish what the learners know, understand and can do. Such evidence may be gathered through course related activities and/or through work related activities. In cases where candidates do not attend formal courses, assessors should seek work related evidence as far as possible.

Assessors should ensure that learners submitting themselves to RPL are thoroughly briefed prior to assessment. Learners will be required to submit a Portfolio of Evidence in the prescribed format to be assessed for formal recognition.

Where courses are provided for learners, institutions can use the unit standards and this qualification to assess learning achievements. For learners who are not able to achieve the outcomes, providers can then use the standards and qualifications to determine a specific learning program to suit the learning needs of the candidates.

Access to Qualification:

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

QUALIFICATION RULES
The qualification consists of:

Fundamental, Core and Elective unit standards. A minimum of 131 credits is required to achieve this qualification. The credits are allocated as follows:

> 56 credits from the Fundamental component are compulsory for all the learners.

The fundamental component consists of the following learning:

> Unit standards at NQF Level 4, totalling 16 credits in Mathematical literacy.
> Unit standards at NQF Level 4, totalling 20 credits in Communication in a First South African Language.
> Unit standards at NQF Level 3, totalling 20 credits in Communication in a Second South African Language.

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

69 credits from the Core component are compulsory for all learners.

For the elective component, the qualifying learner must choose a minimum of 5 credits in order to meet the qualification requirements.

EXIT LEVEL OUTCOMES
1. Communicate and solve problems by applying practical mathematical applications in a variety of ways.

2. Interpret a roof plan in order to estimate quantities for roof design in compliance with client expectations and legislative requirements.

3. Demonstrate knowledge of roof truss technology, concepts and required solutions to interpret roof design for estimation.

4. Interface with the client to determine and confirm client needs.

Critical Cross Field Outcomes:

Critical cross field outcomes have been addressed by exit level outcomes as follows:

Trigonometric equations - in relation to roof processes and within the context of an awareness of geometric considerations - are undertaken. This is relative to the following critical cross-field outcomes:

> Make decisions and solve problems.
> Technology and science.
> Work effectively with others.
> Information.
> Related systems.

Skills in verbal and written communication in relation to client roofing requirements and the need to maintain effective working relationships are demonstrated, and their need is explained, relative to the following critical cross-field outcomes:

> Make decisions solve problems.
> Organisation Teamwork.
> Communication.
> Information.
> Work effectively with others.

Procedures, logical sequences and requirements for roof estimation for design are identified and discussed, relative to the following critical cross-field outcomes:

> Make decisions solve problems.
> Communication.
> Technology and science.
> Related systems.
> Information.

Consequences of defective material in relation to key estimation and design requirements are explained in terms of legislative and contractual considerations, relative to the following critical cross-field outcomes:

> Make decisions solve problems.
> Communication.
> Technology and science.
> Related systems.
> Information.
> Work effectively with others.

ASSOCIATED ASSESSMENT CRITERIA

Associated Assessment Criteria for Exit Level Outcome 1:

1.1 Client requirements are gathered and communicated.
1.2 Oral communication is maintained and adapted as required to promote effective interaction in a work context.
1.3 Written communication is conducted at an appropriate level for designated target audiences.
1.4 Oral and written communication is conducted at an appropriate level in a second language.
1.5 Mathematical principles and techniques are applied while performing the tasks in the operational context.
1.6 Solutions are recorded and presented at an appropriate level.

Associated Assessment Criteria for Exit Level Outcome 2:

2.1 Quantity of material required for roof design is estimated.

2.2 Roof layout documents are processed as outlined in the specifications.
2.3 Roof design is interpreted for a roof solution according to client's requirements.
2.4 Trigonometric equations are used to calculate pitch, height and span.
2.5 A GUI-based word processor is used to enhance a document through the use of tables and columns.

Associated Assessment Criteria for Exit Level Outcome 3:

3.1 Knowledge of roof terminology and concepts is applied.
3.2 Knowledge of industry legislation, the various stakeholders, their responsibilities, and compliance requirements is demonstrated.
3.3 The dynamic interaction of the various elements to a functional roof structure is explained.
3.4 Structural material required for a roof design is identified.
3.5 Material best suited for roof design within context is recommended.

Associated Assessment Criteria for Exit Level Outcome 4:

4.1 Problem solving strategies are applied.
4.2 Effective working relationship with clients is developed and maintained.
4.3 Client requirements are established and required design information is gathered and applied.

Integrated Assessment:

Integrated assessment evaluates the learner's ability to combine actions and ideas across a range of activities and knowledge areas. The integrated must specifically assess the learner's ability to:

> Demonstrate competence by means of the practical application of the embedded knowledge in a manner that meets the required performance standards required.
> Illustrate a clear understanding of the concepts, theory and principles that underpin the practical action taken.

The assessment will require assessment methods, which measure and evaluate evidence generated during learning and on-the-job activities. Because assessment practices must be open and transparent, fair, valid and reliable; ensuring that no leaner is disadvantaged in any way whatsoever, an integrated assessment approach is incorporated into the qualification.

A variety of methods must be used in assessment tools and activities must be appropriate to the context in which the learner is working or will work. Where it id not possible to assess the learner at the workplace, simulations, case studies role plays and other similar techniques should be used to provide a context appropriate to the assessment.

The term integrated assessment implies that theoretical and practical components should be assessed together. Whenever possible, the assessment of knowledge, skills, attitudes and values shown in the unit standards should be integrated and, during integrated assessment, the assessor should make use of a range of formative and summative assessment tools and methods. Combinations of practical, applied, foundational and reflective competencies should be assessed. Assessment should further ensure that all specific outcomes, embedded knowledge and critical cross field outcomes are evaluated in an integrated way.

Assessors must assess and give credit for the evidence of learning that has already been acquired through formal, informal and non-formal learning and work experience as the assessment process is capable of being applied to RPL, subject to the rules and criteria of the relevant ETQA.

INTERNATIONAL COMPARABILITY

The qualification was benchmarked against qualifications from New Zealand, United States of America and Australia.

New Zealand:

There are easily comparable similarities between the South African and New Zealand qualifications. Generally, both countries adopt the same approach in their requirement for learners to acquire what are considered "foundational" competencies in roofing/building concepts, i.e.:

> Terminology.
> Knowledge of the broader industry.
> Its norms and the legal requirements.
> Material used.
> Structures used.
> The ability to do related calculations.
> And the interaction between the roof plan, the desired material, wall and roof structure and the intended roof design.

The qualifying learner is able to: Perform building calculations, demonstrate knowledge of preliminary work needed for construction, demonstrate knowledge of compliance with building legislation, demonstrate knowledge of timber used in construction, demonstrate knowledge of working drawings, specifications and quantity lists, describe timber wall framing and components, demonstrate knowledge of equal pitch gable, and hip roof construction, demonstrate knowledge of construction of alternative roof structures.

The majority of the unit standards that express the competencies referred to above, is located in both South Africa and New Zealand, at NQF Level 4.

In New Zealand, these individual unit standards straddle the fields: Planning and Construction and the sub field: Carpentry. The singular South African Roof Truss Technology qualification, which is located within the Forestry and nature conservation field and the forestry and wood processing sub-field, is different from the loose unit standards that make up the competencies referred to above. The different credit weightings of the unit standards may be a function of their location, function and rationale, in their context.

United States of America (USA):

The Texas State Technical College offers a course in Conventional Roof Systems: (CRPT 1411) Construction Management System (120 hrs) at introductory level. Overall, the course is aimed at addressing design and construction skills needed to construct a conventional roof system. This qualification is, at its core, similar to the South African Roof Truss Technology, in many ways. It introduces roof components, types, layout, theory and roof design solutions, together with the attendant calculations.

Equivalents of fundamental and critical cross-field outcomes are included as part of the qualification design. These include the use of critical thinking, reading and writing skills, the need to exhibit professional skills in personal conduct.

The difference is that the Conventional Roof Systems course has a roof and ceiling design component that is not part of the South African Roof Truss Technology qualification.

The Green River Community College in Washington provides a variety of courses, under the title Carpentry Technology, which has similar learning areas with the South African Roof Truss Technology qualification in the following areas:

> Carp 144: Residential Blueprint Reading: This entails how to read and interpret architectural blueprints for residential and light commercial market. The South African Roof Truss Technology qualification is limited to roof map reading skills.

> Carp 145: Star design and Construction, topics covered include Star design factor, Building code requirements. The South African Roof Truss Technology qualification focuses on industry legislation, which comprises the various role players, their responsibilities and the various building codes.

> Carp 148: Material Estimating: Introduction to estimating materials, services and other related costs needed to construct a residential home using general pick- off methods. The focus in the South African Roof Truss Technology qualification is on roof estimation.

> Carp 151: International Residential Code. This includes specific requirements of building codes, energy codes, zoning laws, environmental protection requirements. This is covered under legislation as mentioned above.

Australia:

This South African qualification compares, somewhat in its outlook, with the Australian qualification W263-Certificate IV in Building and Construction (Estimating). The qualification is a nationally recognised building construction (BCG40306) qualification.

It is a level 4 qualification which is aimed at enabling the qualifying learner to read and interpret plans and specifications, develop labour and material schedules, estimate costs for a building project and prepare tender documentation. Qualifying learners learn about building codes and standards and structural principles related to low rise residential and commercial buildings.

Compared to the South African Roof Truss Technology qualification, the Australian qualification is a generic building construction qualification that focuses on the domestic and commercial market. It also has the advantage of having the reading and interpreting of generic construction plans and specifications. In addition, the qualification includes the application of risk management technique, produce labour and material schedules for ordering, which are not part of the roof design qualification.

Canada:

Construction Learning Skills (CLS) is a learning organisation in Ontario, central Canada, which provides a course in construction estimator. The course is in three levels: The learner is introduced, at level 1, to the role and responsibilities of a Construction Estimator. The course also covers the necessary company practices and the critical function of the construction estimator in a construction team. The preparation and procedure for setting up a tender document for a construction project are fully covered in the course. Level 2 introduces the learner to quantity surveying and estimating in order to aid the student in determining material quantities and unit cost for a complete project. Level 3 enables the qualifying learner to work in teams to review specifications, take off quantities, and prepare bid forms for large construction projects.

This is, essentially a construction estimation course that can only be compared to the, South African Roof Truss Technology qualification, from an estimation angle.

SADC:

A number of universities in Africa, including South African universities, offer typical undergraduate and graduate programs in quantity surveying, civil engineering and quantity surveying that comprise all or part of a full qualification.

For example, in its Structural Engineering undergraduate course, the University of Alexandria (Egypt) offers, at undergraduate level, courses, such as Theory of Structures-1(CE 161), which includes the following elements of the Roof Truss Technology qualification:
Types of structures and supports, types of loads, differential relations between loads and internal forces, internal forces in simple, compound, and subdivided trusses and trussed beams.

Other undergraduate courses include Properties of materials 1 (CE 162). However, in relation to the courses offered by the Universities, we were unable to determine the exact nature of the value of the credits in the undergraduate courses, as well as how these would directly articulate with the NQF Level 4 qualification: Roof Truss Technology in South Africa.

Conclusion:

Based on the above, the survey indicates that the Roof Truss Technology qualification is introductory in nature.

The American and New Zealand courses are located in the carpentry sub-field of physical planning and construction.

In contrast, the South African Roof Truss Technology qualification resides in the field Forestry and Nature Conservations, and in the sub filed: forestry and wood processing. The remainder of the components is elements of classical structural engineering.
Accordingly, the core elements of material theory and structure, codes, calculations, map reading and interpretation are consistent across the board.

Despite the above, the South African qualification will always stand out in its insistence on the need to demonstrate the fundamental literacy/communication and numeracy skill in order to address inequalities of the past, and in line with National Qualifications Framework (NQF) principles.

Summary:

In summary, the Roof Truss Technology qualification is a hybrid of physical planning, structural engineering and estimation.

On the one side the are the practical applications of construction's carpentry and on the other side, the elements of quantity surveying, for example, construction cost estimates, schedules of materials controlling the cost of labour, plant and materials.

ARTICULATION OPTIONS
Upon completion of this qualification, the learner will articulate horizontally to:

> ID 49053: National Certificate: Supervision of Construction Processes, NQF Level 4.
> ID 50018: Further Education and Training Certificate: Computer Aided Drawing Office Practice, NQF Level 4.
> ID 50441: National Certificate: (Vocational) Level 4, NQF Level 4.

Vertically to:

> ID 49419: National Diploma: Business Consulting Practice, NQF Level 5.

MODERATION OPTIONS

> Anyone assessing a learner or moderating the assessment of a learner against the qualification must be registered as an assessor with the relevant Education, Training, Quality, Assurance (ETQA) Body, or with an ETQA that has a Memorandum of Understanding 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 Education, Training, Quality, Assurance (ETQA) Body, or with an ETQA that has a Memorandum of Understanding with the relevant ETQA.

> Assessment and moderation of assessment will be overseen by the relevant Education, Training, Quality, Assurance (ETQA) Body, or by an ETQA that has a Memorandum of Understanding with the relevant ETQA, according to the ETQA`s policies and guidelines for assessment and moderation.

> Moderation must include both internal and external moderation of assessments, unless ETQA policies specify otherwise. Moderation should also encompass achievement of the competence described in the associated unit standards.

> Anyone wishing to be assessed against this qualification may apply to be assessed by any assessment agency, assessor or provider institution that is accredited by the relevant ETQA.

CRITERIA FOR THE REGISTRATION OF ASSESSORS

> Anyone assessing a learner against this qualification with the relevant ETQA as an assessor.

> Any institution offering learning that will enable the achievement this qualification must be accredited as a provider with the relevant ETQA. Assessment will be overseen by the relevant ETQA according to the policies and guidelines for assessment of that ETQA, in terms of agreements reached around assessment and between various ETQA's (including professional bodies).

> Anyone wishing to be assessed against this qualification may apply to be assessed any assessment agency, assessor or provider institution that is accredited by the relevant ETQA.

> The options as listed above provide the opportunity to ensure that assessment and moderation can be transparent, affordable, valid reliable and non-discriminatory.

> For an applicant to register as an assessor or moderator of this qualification, the applicant needs:

> To be registered as an assessor with the relevant ETQA.
> To be in possession of the relevant qualification.
> To have sufficient relevant experience.
> To have the appropriate qualification to assess communication and mathematical literacy.

NOTES

N/A

UNIT STANDARDS

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
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	119465	Write/present/sign texts for a range of communicative contexts	Level 3	5
Fundamental	12154	Apply comprehension skills to engage oral texts in a business environment	Level 4	5
Fundamental	12155	Apply comprehension skills to engage written texts in a business environment	Level 4	5

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Fundamental	7484	Describe, represent, analyse and explain changes in shape and motion in 2- and 3-dimensional space with justification	Level 4	4
Fundamental	7481	Find the derivatives and integrals of a range of functions including the trigonometric functions and apply these to problems	Level 4	4
Fundamental	7483	Solve problems involving sequences and series in real and simulated situations	Level 4	2
Fundamental	12153	Use the writing process to compose texts required in the business environment	Level 4	5
Fundamental	7470	Work with a wide range of patterns and inverses of functions and solve related problems	Level 4	6
Fundamental	119459	Write/present/sign for a wide range of contexts	Level 4	5
Core	119078	Use a GUI-based word processor to enhance a document through the use of tables and columns	Level 3	5
Core	263794	Apply knowledge and understanding of roof erection document requirements	Level 4	3
Core	263777	Apply knowledge and understanding of roof terminology and concepts	Level 4	4
Core	263795	Apply knowledge and understanding of structural material in the roofing industry	Level 4	6
Core	263762	Apply knowledge and understanding of truss manufacturing in recommendations made for roof design	Level 4	5
Core	14927	Apply problem solving strategies	Level 4	4
Core	263758	Apply trigonometry equations to calculate pitch, height and span	Level 4	4
Core	263776	Demonstrate knowledge of industry legislation, the various stakeholders, their responsibilities, and compliance requirements	Level 4	10
Core	14467	Establish client requirements and gather and apply required design information	Level 4	6
Core	263764	Estimate the quantity of material required for a roof design	Level 4	5
Core	263814	Explain the dynamic interaction of the various elements to a functional roof structure	Level 4	4
Core	263818	Recommend material best suited for roof design	Level 4	5
Core	119173	Develop and maintain effective working relationship with clients	Level 5	8
Elective	263775	Demonstrate an understanding of the impact of wind on roof engineering design	Level 4	10
Elective	14471	Plan drawing layout	Level 4	6
Elective	263842	Demonstrate an understanding of a roofing business environment	Level 5	10
Elective	263841	Identify the structural material specification for a roof design	Level 5	4

LEARNING PROGRAMMES RECORDED AGAINST THIS QUALIFICATION
None

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Apply trigonometry equations to calculate pitch, height and span

SAQA US ID	*UNIT STANDARD TITLE*		
263758	Apply trigonometry equations to calculate pitch, height and span		
ORIGINATOR		*PROVIDER*	
SGB Forestry			
FIELD		*SUBFIELD*	
1 - Agriculture and Nature Conservation		Forestry and Wood Technology	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 4	4

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

SPECIFIC OUTCOME 1
List and discuss the trigonometry equations.

SPECIFIC OUTCOME 2
Apply the relevant trigonometric equation to calculate the height of a truss.

SPECIFIC OUTCOME 3
Apply the relevant trigonometric equation to calculate the span and pitch of a truss.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	66370	Further Education and Training Certificate: Roof Truss Technology	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Apply knowledge and understanding of truss manufacturing in recommendations made for roof design

SAQA US ID	*UNIT STANDARD TITLE*		
263762	Apply knowledge and understanding of truss manufacturing in recommendations made for roof design		
ORIGINATOR		*PROVIDER*	
SGB Forestry			
FIELD		*SUBFIELD*	
1 - Agriculture and Nature Conservation		Forestry and Wood Technology	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 4	5

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

SPECIFIC OUTCOME 1
Apply an understanding of material selection.

SPECIFIC OUTCOME 2
Apply an understanding of material preparation and accuracy.

SPECIFIC OUTCOME 3
Apply an understanding of manufacturing tolerances.

SPECIFIC OUTCOME 4
Describe the quality control procedure.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	66370	Further Education and Training Certificate: Roof Truss Technology	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Estimate the quantity of material required for a roof design

SAQA US ID	*UNIT STANDARD TITLE*		
263764	Estimate the quantity of material required for a roof design		
ORIGINATOR		*PROVIDER*	
SGB Forestry			
FIELD		*SUBFIELD*	
1 - Agriculture and Nature Conservation		Forestry and Wood Technology	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 4	5

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

SPECIFIC OUTCOME 1
Identify types of materials required.

SPECIFIC OUTCOME 2
Calculate quantities of materials required.

SPECIFIC OUTCOME 3
Complete and submit an estimate.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	66370	Further Education and Training Certificate: Roof Truss Technology	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate an understanding of the Impact of wind on roof engineering design

SAQA US ID	*UNIT STANDARD TITLE*		
263775	Demonstrate an understanding of the impact of wind on roof engineering design		
ORIGINATOR		*PROVIDER*	
SGB Forestry			
FIELD		*SUBFIELD*	
1 - Agriculture and Nature Conservation		Forestry and Wood Technology	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 4	10

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

SPECIFIC OUTCOME 1
Explain the effect of wind on the roof of a structure.

SPECIFIC OUTCOME 2
Explain the effect of Terrain Category and Class of Buildings on wind force.

SPECIFIC OUTCOME 3
Calculate external and internal pressures on buildings with different shapes and heights.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66370	Further Education and Training Certificate: Roof Truss Technology	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Apply knowledge and understanding of structural material in the roofing industry

SAQA US ID	*UNIT STANDARD TITLE*		
263795	Apply knowledge and understanding of structural material in the roofing industry		
ORIGINATOR		*PROVIDER*	
SGB Forestry			
FIELD		*SUBFIELD*	
1 - Agriculture and Nature Conservation		Forestry and Wood Technology	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 4	6

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

SPECIFIC OUTCOME 1
Describe the different materials used in roofing.

SPECIFIC OUTCOME 2
Identify the structural properties and non-compliance of timber and steel.

SPECIFIC OUTCOME 3
Identify the structural connectors and their application.

SPECIFIC OUTCOME 4
Differentiate between the advantages and disadvantages of the different structural materials.

SPECIFIC OUTCOME 5
Identify the specification criteria.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	66370	Further Education and Training Certificate: Roof Truss Technology	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Apply knowledge and understanding of roof terminology and concepts

SAQA US ID	*UNIT STANDARD TITLE*		
263777	Apply knowledge and understanding of roof terminology and concepts		
ORIGINATOR		*PROVIDER*	
SGB Forestry			
FIELD		*SUBFIELD*	
1 - Agriculture and Nature Conservation		Forestry and Wood Technology	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 4	4

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

SPECIFIC OUTCOME 1
Demonstrate an understanding of roofing terminology.

SPECIFIC OUTCOME 2
Demonstrate an understanding of truss terminology and types.

SPECIFIC OUTCOME 3
Demonstrate an understanding of roofing dimensions.

SPECIFIC OUTCOME 4
Identify and describe roofing sundry terms.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	66370	Further Education and Training Certificate: Roof Truss Technology	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Apply knowledge and understanding of roof erection document requirements

SAQA US ID	***UNIT STANDARD TITLE***		
263794	Apply knowledge and understanding of roof erection document requirements		
ORIGINATOR		***PROVIDER***	
SGB Forestry			
FIELD		***SUBFIELD***	
1 - Agriculture and Nature Conservation		Forestry and Wood Technology	
ABET BAND	***UNIT STANDARD TYPE***	***NQF LEVEL***	***CREDITS***
Undefined	Regular	Level 4	3

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

SPECIFIC OUTCOME 1
Generate the site documents required for roof erection.

SPECIFIC OUTCOME 2
Demonstrate an understanding of the legal impact of confirmation of receipt of site document.

SPECIFIC OUTCOME 3
Demonstrate an understanding of the legal implications of complete/incomplete site details.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	66370	Further Education and Training Certificate: Roof Truss Technology	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate knowledge of industry legislation, the various stakeholders, their responsibilities, and compliance requirements

SAQA US ID	*UNIT STANDARD TITLE*		
263776	Demonstrate knowledge of industry legislation, the various stakeholders, their responsibilities, and compliance requirements		
ORIGINATOR		*PROVIDER*	
SGB Forestry			
FIELD		*SUBFIELD*	
1 - Agriculture and Nature Conservation		Forestry and Wood Technology	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 4	10

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

SPECIFIC OUTCOME 1
List and describe the legislative framework applicable to roofing as per industry standards

SPECIFIC OUTCOME 2
Describe the governance structures, the inspection authorities and the relevant criteria that are applicable to the roofing industry.

SPECIFIC OUTCOME 3
Demonstrate an understanding of the various industry players and their responsibilities in line with the relevant legislation.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	66370	Further Education and Training Certificate: Roof Truss Technology	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Explain the dynamic interaction of the various elements to a functional roof structure

SAQA US ID	*UNIT STANDARD TITLE*		
263814	Explain the dynamic interaction of the various elements to a functional roof structure		
ORIGINATOR		*PROVIDER*	
SGB Forestry			
FIELD		*SUBFIELD*	
1 - Agriculture and Nature Conservation		Forestry and Wood Technology	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 4	4

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

SPECIFIC OUTCOME 1
Discuss triangulation and the transfer of the load to the foundations with respect to roof structure.

SPECIFIC OUTCOME 2
Differentiate between load definitions, application and specification with respect to roof structure.

SPECIFIC OUTCOME 3
Identify the difference between, and impact of the different types of structural forces.

SPECIFIC OUTCOME 4
Identify the strength and impact of materials on a structure.

SPECIFIC OUTCOME 5
Describe the methods of connections used in the design and manufacture of trusses.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	66370	Further Education and Training Certificate: Roof Truss Technology	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Recommend material best suited for roof design

SAQA US ID	*UNIT STANDARD TITLE*		
263818	Recommend material best suited for roof design		
ORIGINATOR		*PROVIDER*	
SGB Forestry			
FIELD		*SUBFIELD*	
1 - Agriculture and Nature Conservation		Forestry and Wood Technology	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 4	5

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

SPECIFIC OUTCOME 1
Recommend material options for roof design as per roof design drawing.

SPECIFIC OUTCOME 2
Prepare material by demonstrating an understanding of organisational and sector requirements.

SPECIFIC OUTCOME 3
Demonstrate understanding of manufacturing tolerances with respect to roof structure.

SPECIFIC OUTCOME 4
Describe manufacturing limitations in terms of roof structure.

SPECIFIC OUTCOME 5
Conduct quality control in respect of roof design estimation.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	66370	Further Education and Training Certificate: Roof Truss Technology	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Identify the structural material specification for a roof design

SAQA US ID	***UNIT STANDARD TITLE***		
263841	Identify the structural material specification for a roof design		
ORIGINATOR		***PROVIDER***	
SGB Forestry			
FIELD		***SUBFIELD***	
1 - Agriculture and Nature Conservation		Forestry and Wood Technology	
ABET BAND	***UNIT STANDARD TYPE***	***NQF LEVEL***	***CREDITS***
Undefined	Regular	Level 5	4

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

SPECIFIC OUTCOME 1
Identify structural materials as per design specification.

SPECIFIC OUTCOME 2
Identify materials that can optimise the design.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66370	Further Education and Training Certificate: Roof Truss Technology	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate an understanding of a roofing business environment

SAQA US ID	*UNIT STANDARD TITLE*		
263842	Demonstrate an understanding of a roofing business environment		
ORIGINATOR		*PROVIDER*	
SGB Forestry			
FIELD		*SUBFIELD*	
1 - Agriculture and Nature Conservation		Forestry and Wood Technology	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 5	10

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

SPECIFIC OUTCOME 1
Demonstrate an understanding of the internal responsibilities within the organisation.

SPECIFIC OUTCOME 2
Apply knowledge and understanding of the impact of estimating correctly.

SPECIFIC OUTCOME 3
Apply knowledge and understanding of contractual requirements.

SPECIFIC OUTCOME 4
Demonstrate an understanding of the impact of design and manufacturing inefficiencies.

SPECIFIC OUTCOME 5
Demonstrate understanding of the handling of trusses.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66370	Further Education and Training Certificate: Roof Truss Technology	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:
Further Education and Training Certificate: General Forestry

SAQA QUAL ID	*QUALIFICATION TITLE*		
66349	Further Education and Training Certificate: General Forestry		
ORIGINATOR		*PROVIDER*	
SGB Forestry			
QUALIFICATION TYPE	*FIELD*	*SUBFIELD*	
Further Ed and Training Cert	1 - Agriculture and Nature Conservation	Forestry and Wood Technology	
ABET BAND	*MINIMUM CREDITS*	*NQF LEVEL*	*QUAL CLASS*
Undefined	120	Level 4	Regular-Unit Stds Based

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

PURPOSE AND RATIONALE OF THE QUALIFICATION
Purpose:

The general management and maintenance of forests is an important part of ensuring the sustainability of the industry and the environment. A number of established methods are available to achieve these goals.

There is a need for technical and general operational management to achieve established forestry goals and priorities. Generic management skills and technical operational forestry skills jointly enable the reaching of identified forestry priorities and objectives.

The need to achieve greater balance is often a product of the interplay between the various stakeholders under the guidance of forestry professionals. This may necessitate the participation of the local community in forestry initiatives undertaken in their area or within the community's immediate environment.

This Qualification provides the qualifying learner with the skills required to:

> Use numeric skills in forestry operations.
> Advise and inform role players about the regulatory requirements impacting on forestry operations for compliance.
> Manage technical forestry operations in own area of specialisation.
> Apply operational management skills to forestry operation(s).
> Design and execute community development initiatives.

Range: Small scale contractor/small business owner, the Forest Foreman, the Assistant Forester and Community engagement officer.

This qualification will allow the learner to acquire and develop the following competencies:

> Describe and apply the core functions in the forestry environment.
> Apply the budget function in a business unit.
> Explain Human Resource policies and procedures.
> Apply safety, health and environment protection procedures.

> Conduct basic map reading.
> Demonstrate understanding of the principles of Silviculture and Fire Protection.
> Demonstrate understanding of the principles of Forest Engineering practices.

Rationale:

Role players within the Forest Industry Stakeholders/organisation:

Department of Water Affairs and Forestry (DWAF), Forestry Structure Council (FSC), Forestry South Africa (FSA), House of traditional leadership, South African Forestry Contractors Association (SAFCA), World Wildlife Foundation (WWF), Forest Industries Training Providers Association.

There is currently a need for a Qualification in the area of forestry at the lower levels, from and between the level of Ground Worker and the First Line Manager or Supervisor. This range also includes the small scale forestry operator who runs a small business. The need that necessitates the construction of this Qualification is generally that of managing a small scale forestry operation through operational management skills and the application of related technical forestry skills.

Those standing to benefit from the Qualification are operators of forestry SMME's and previously disadvantaged persons who are currently in the field, as employees. The list of beneficiaries also includes Previously Disadvantaged Individual) PDI 's, and other persons with the requisite job experience who may want to exercise the option of Recognition of Prior Learning (RPL).

Accordingly, the objectives of increased access to learning opportunities are reached and the capacity to deal with forestry and related environment challenges is increased.

Transformational areas and beneficiaries:

This qualification will benefit Department of Water Affairs and Forestry, (DWAF), WAF, FSC, FSA, House traditional leadership, South African Forestry Contractors Association (SAFCA), World Wildlife Foundation, Forest Industries Training Providers Association.

Target Learners:

Learners who are currently working in the industry and new entrants who aspire to pursue a career in Forestry.

Other groups of people to benefit from this qualification will include rural communities which are located adjacent to forestry operations.
Emerging contractors also stand a chance to benefit from this qualification as it will professionalize their entrepreneurial initiatives.

NQF Principles:

In keeping with NQF principles, this qualification seeks to create increased learning opportunities for persons and communities in outlying areas in and around forestry plantations. In the same way, it enables the formalization of prior learning in forestry learning areas. This ensures that principles of access and redress are actualized. The other principles of portability and so on, are actualised through the articulation of this qualification.

RECOGNIZE PREVIOUS LEARNING?
Y

LEARNING ASSUMED IN PLACE

This qualification assumes that the candidate has already achieved the following:

> ID 50266: National Certificate: Forestry: Silviculture at NQF Level 3.
> ID 48988: National Certificate: Timber Harvesting at NQF Level 3.
> An equivalent set of experience at entry.

Access to the Qualification:

> Access to this Qualification is open.

Recognition of Prior Learning (RPL):

This Qualification can be achieved wholly or in part through Recognition of Prior Learning. Whether a learner attends formal courses or acquires the required skills through informal means, the same standards apply as per the matrix of unit standards and Exit Level Outcomes.

The Qualification and the Unit Standards have been written in such a way that the learning has to be assessed in an integrated way. Assessors will assess evidence to establish what the learners know, understand and can do. Such evidence may be gathered through course related activities and/or through work related activities. In cases where candidates do not attend formal learning programs, assessors should seek work related evidence as far as possible.

Assessors should ensure that learners submitting themselves to RPL are thoroughly briefed prior to assessment. Learners will be required to submit a Portfolio of Evidence in the prescribed format to be assessed for formal recognition.

Where courses are provided for learners, institutions can use the Unit Standards and this Qualification to assess learning achievements. For learners who are not able to achieve the outcomes, providers can then use the Unit Standards and Qualification to determine a specific learning program to suit the learning needs of the candidate.

QUALIFICATION RULES
Fundamental Component:

All fundamental unit standards are compulsory (56 credits).

The fundamental Component consists of the following, which is compulsory for all learners:

> Unit standards at NQF Level 4, totalling 16 credits in Mathematical Literacy.
> Unit standards at NQF Level 4, totalling 20 credits in Communication in a First South African Language.
> Unit standards at NQF Level 3, totalling 20 credits in Communication in a Second South African Language.

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

Core Component:

All core unit standards are compulsory (34 credits).

Elective Component:

There are five elective pathways, Forest Engineering Management, Silviculture Management, Small Business Management, Community engagement Officer and Safety, Health and Environment Officer.

Specialisation path 1: Forest Engineering Management with unit standards titles below with 19 credits:

> Apply knowledge of manual and mechanized harvesting and transport systems.
> Supervise aerial extraction systems.
> Supervise maintenance of forest roads.
> Cost harvesting and transport operations.
> Prepare an operational harvest plan.

Specialisation path 2: Silviculture Management with unit standards titles below with 27 credits:

> Demonstrate knowledge of Silviculture in commercial forestry.
> Cost Silviculture operations.
> Prepare an operational Silviculture plan.
> Specialisation path 3: Social and Community Forestry with unit standards titles below with 23 credits:

> Conduct basic community needs.
> Develop networks for development practice.
> Identify and facilitate the implementation of a community forest project.

Specialisation path 4: Business and Human Resources Management with unit standards titles below with 23 credits:

> Finance a new venture.
> Manage finances of a new venture.
> Produce business plans for a new venture.
> Tender to secure business for a new venture.

Specialisation path 5: Environment, Health and Safety with unit standards titles below with 27 credits:

> Explain and apply environmental legal principles, rights, duties and responsibilities to a specific work context.
> Apply safety, health and environment protection procedures.
> Perform administrative functions during wildfire suppression.
> Manage a crew during wildfire suppression.
> Lead a strike attack force to contain or extinguish a wildfire.

General Electives with unit standards titles below with 30 credits:

> Demonstrate knowledge and understanding of HIV/AIDS in a workplace and its effect on a business sub-sector, own organisation and a specific workplace.
> Participate in a group to recommend solutions to problems.
> Negotiate an agreement in an authentic work solution.
> Supervise work unit to achieve objectives (individuals and teams).
> Apply routine maintenance and servicing plans and procedures.
> Demonstrate knowledge of nursery practices including seedling quality.

Note: Each of the specialization areas has a different number of credits. The minimum number of elective credits is 30. Therefore the balance of credits required to achieve this qualification must be selected from any of the other elective pathways.

EXIT LEVEL OUTCOMES

1. Use numeric skills in forestry operations.

2. Advise and inform relevant parties and or subordinates about the regulatory codes governing and or impacting on forestry operations for compliance.
>Range: Colleagues, subordinates, the local community.

3. Manage technical forestry operations in own area of specialisation.
> Range: The qualifying learner should be able to know, understand and apply the theory and practical applications of own area of specialisation and its impact on role players and their area of operation.

4. Apply operational management skills to forestry operation(s).

5. Conduct community development and liaison in relation to forestry.
> Range: The qualifying learner should be able to know, understand and apply the theory and practical requirements of the impact of forestry on the local community, in terms of socio-economic and ecological development and sustainability.

Critical Cross-Field Outcomes:

Critical Cross-field outcomes have been addressed by the Exit Level Outcomes, as follows:

Identify and solve problems:

This will be achieved when qualifying learners:

> Identify and classify forests.
> Conduct risk assessment.
> Community development needs.

Work effectively with others as a member of a team or organisation.

This will be achieved when qualifying learners:

> Contribute to team and operational goals.
> Adhere to operational procedures.
> Support team members in adhering to procedures and work roles to be carried out.
> Adhere to team and organisational protocols.

Organise and manage oneself and one's activities responsibly and effectively.

This will be achieved when qualifying learners:

> Respond appropriately to risk and hazards.
> Apply work procedures appropriately to meet work requirement.

Collect, analyse, organise and critically evaluate information.

This will be achieved when qualifying learners:

> Conduct risk assessment.
> Respond appropriately to risks identified.
> Apply legal and environmental standards.
> Choice and use of equipment (chain saw and protective clothing).

Communicate effectively by using mathematical and language skills in the modes of oral and written presentations.

This will be achieved when qualifying learners:

> Report injures.
> Brief ground crew.
> Communicate with role players.

Use science and technology effectively and critically, showing responsibility towards the environment and health of others.

This will be achieved when qualifying learners:

> Apply occupational health, safety and environmental requirements in the workplace.
> Adhere to sector standards.
> Use and care for equipment properly.

Demonstrate an understanding of the world as a set of related systems by recognizing that problem solving contexts do not exist in isolation.

This will be achieved when qualifying learners:

> Provide appropriate solutions to forestry needs identified.
> Conduct risk assessment.
> Apply occupational health, safety and environmental requirements in the workplace.
> Assist team members.

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

Financial projections, budgets, business ratio analyses and numeric applications specific to forestry business operations are:

1.1 Explained in relation to forestry operations.
1.2 Undertaken correctly in relation to forestry operations.

Associated Assessment Criteria for Exit Level Outcome 2.

2.1 Relevant parties are advised and informed about the regulatory requirements governing and or impacting on forestry operations for compliance
Range:
> Occupational Health and Safety Act.
> Relevant forestry legislation.
> Relevant forestry legislation.

Associated Assessment Criteria for Exit Level Outcome 3.

The following technical standards are explained or demonstrated in relation to forestry operations:

3.1 Technical operational objectives.
3.2 Technical operational procedures.
3.3 Technical applications.
3.4 Sector norms and standards.

3.5 Operational requirements.

Associated Assessment Criteria for Exit Level Outcome 4.

4.1 Operational plans for forestry operations are developed and executed.
4.2 Human Resource for forestry operations are developed and executed.
4.3 Monitoring and review plans for forestry operations are developed and executed.
4.4 Operational documentation for forestry operations is developed and executed.

Associated Assessment Criteria for Exit Level Outcome 5.

Design and execution of community development initiatives, are in line with:

5.1 Forestry project objectives.
5.2 Organisational standards.
5.3 Sector specific guidelines.

Integrated Assessment:

Integrated assessment evaluates the learner's ability to combine actions and ideas across a range of activities and knowledge areas. The integrated assessment must specifically assess the learner's ability to:

> Demonstrate competence by means of the practical application of the embedded knowledge in a manner that meets the required performance standards required.
> Illustrate a clear understanding of the concepts, theory and principles that underpin the practical action taken.

The assessment will require assessment methods which measure and evaluate evidence generated during learning and on-the-job activities. Because assessment practices must be open and transparent, fair, valid and reliable; ensuring that no leaner is disadvantaged in any way whatsoever, an integrated assessment approach is incorporated into the Qualification.

A variety of methods must be used in assessment tools and activities must be appropriate to the context in which the learner is working or will work. Where it is not possible to assess the learner at the workplace, simulations, case studies role plays and other similar techniques should be used to provide a context appropriate to the assessment.

The term integrated assessment implies that theoretical and practical components should be assessed together. Whenever possible, the assessment of knowledge, skills, attitudes and values shown in the Unit Standards should be integrated and, during integrated assessment, the assessor should make use of a range of formative and summative assessment tools and methods. Combinations of practical, applied, foundational and reflective competencies should be assessed. Assessment should further ensure that all specific outcomes, embedded knowledge and critical cross field outcomes are evaluated in an integrated way.

Assessors must assess and give credit for the evidence of learning that has already been acquired through formal, informal and non-formal learning and work experience as the assessment process is capable of being applied to RPL, subject to the rules and criteria of the relevant ETQA.

INTERNATIONAL COMPARABILITY
United Kingdom:

In conducting the international comparability for this qualification, three countries, namely New Zealand, the United Kingdom and Canada were selected. The two countries were selected for

the ease with which their qualifications could be compared to their South African equivalents, on a like-on-like basis. Canada, with its expansive forests, as well as its expertise in the field was also selected.

National Qualifications:

Forestry Level 2

In the UK, all vocational qualifications fall under the qualifications, National Vocational Qualifications (NVQs) and Scottish Vocational Qualifications (SVQs). The qualification under review in South Africa, is comparable to the following:

Forestry NVQ/SVQ Level 2 with two streams: Forestry: planning new forest plantation and Harvesting: planning, felling, delimbing, extraction, log making, fleeting, loading and finally transportation to log yards for further processing).

Arboriculture Level 2, and Tree Work Level 3:

> Arboriculture NVQ/SVQ Level 2.
> Tree work NVQ/SVQ Level 3.

Mandatory units:

> Maintain activities to meet requirements (Management Standards).
> Unit B1 Support the efficient use of resources (Management Standards).
> Unit C5 Develop productive working relationships (Management Standards).
> Unit CU3 Promote, monitor and maintain health, safety and security.

The following learning unit could be compared to the South African forestry costing equivalent:

Unit CU96 Develop, negotiate and agree proposals to offer.

New Zealand

This country probably has the widest range of qualifications in forestry in the Level 2-4 Band that can be directly compared to the same South African range. The forestry Training Guide is a useful tool that comprises the following wide range of qualifications:

National Certificate Programmes:

> National Certificate in Forestry (Foundation Skills) 6, Level 2, Credits 60.
> National Certificate in Forestry (Establishment and Silviculture) 9, Level 3, Credits 90.
> National Certificate in Forestry (Forest Establishment) 13, Level 4, Credits 90.
> National Certificate in Forestry (Mechanical Land Preparation) 17, Level 4, Credits 90.
> National Certificate in Forestry (Silvicultural Pruning) 20, Level 4, Credits 90.
> National Certificate in Forestry (Silvicultural Thinning) 23, Level 4, Credits 90.
> National Certificate in Forestry (Harvesting) 26, Level 3, Credits 90.
> National Certificate in Forestry (Tree Felling) 28, Level 4, Credits 90.
> National Certificate in Forestry (Ground Based Harvesting - Extraction) 31, Level 4, Credits 120.
> National Certificate in Forestry (Mechanised Harvesting) 34, Level 4, Credits 120.
> National Certificate in Forestry (Cable Harvesting - Extraction) 37, Level 4, Credits 120.
> National Certificate in Forestry (Log Making) 40, Level 4, Credits 90.
> National Certificate in Forestry (Log Scaling) 43, Level 4, Credits 60.
> National Certificate in Forestry (Log Loading) 46, Level 4, Credits 90.

Contents:

> National Certificate in Forestry (Mensuration) 49, Level 4, Credits 60.
> National Certificate in Forestry (Operations Management) 52, Level 4, Credits 90.

General Code of practice for forestry players:

The Code of Practice is a tool for people involved in forest management. It has been developed by the New Zealand Forestry Association and endorsed by other major industry organizations. The aim to help forest managers, contractors and their staff take into account the many factors which influence forest management and operations. The Code is based around 18 Best Environmental Management Practices (BEPs) which are structured as practical decision-making and audit tools.

Code of practice for health and safety in the field of forestry:

A statement of statutory requirements, rules and provisions, based on preferred work practices and arrangements, for the purpose of ensuring the health and safety of persons to which this code applies and persons who may be affected by the code. The code is supported by guidelines containing safety, health, training and operational information and outlining preferred work practices or arrangements on the major components related to each part. This will be practical information for those carrying out or directly associated with the work.

Canada

There is only one post secondary school in Canada that specialises in General Forestry. Most of the training and educational course work in Canada that could be said to compare with the South African equivalent is at University undergraduate level. There are also a number of post High School Courses that have the status of Continuing Education or professional short courses at the various Universities.

The following is a sample of comparable undergraduate programs at the University of Brunswick:

Core Course:

Introduction to Forestry FOR 10014 ch (3C 3L):

This course provides students with an overview of field forestry skills through collection and analysis of basic stand-level inventory data. Emphasis is on developing basic mensuration and computation skills through a series of laboratory exercises and practical problems. Students learn how to quantify stand structure and to use basic quantitative information to make forestry decisions.

Forest Dynamics and Management 4 ch (3C 3L):

For 2006: Focuses on modelling forests and examining the nature of their change with and without intervention. Introduces a decision-making process to manage change in forests.

For 2014 Structure and Development of Woody Plants 3 ch (2C 3L):

Development of woody-plant structure from embryo to maturity. Topics include morphogenesis and basic anatomy, development of crown architecture, interrelationships between crown and stem development, wood and elements of wood quality, mechanisms of asexual and sexual

reproduction. For each topic, differences among major genera will be considered. Prerequisite: FOR 2425.

FOR 2425 Autecology of Forest Vegetation 4 ch (3C 3L) Recognition and identification of species, environmental requirements, and persistence mechanisms of various life-forms of forest vegetation; interpretation of silvical characteristics of tree species; analysis of stands of trees in relation to general site conditions and relative stage of development; and evaluation of interrelationships among components of forest vegetation over time, including likely responses to perturbation or to interventions of various kinds.Prerequisite: A basic university course in Biology or Botany, Co-requisite: FOR 2435.

FOR 2432 Forest Inventory and Growth 4 ch (3C 3L):

This course focuses on the design and analysis of forest-level inventories. Concepts of stratification and multistage sampling are presented. Approaches to modelling and predicting stand growth and inventory updates are explored.

FOR 2505 Soils for Plant Growth 3 ch (2C 3L):

Students examine relationships between soils and plants, and related roles of water and nutrients. Factors that restrict root growth, and processes that influence soil development are revealed through field exercises and laboratory work. Effects of natural and anthropogenic disturbances on forest soils and subsequent plant responses are emphasized.

FOR 3005 Silviculture and Stand Intervention Design 5 ch (3C 6L) Takes a design-based approach to Silviculture. Students develop stand intervention plans for the main stages of stand development integrating the biology of growing trees, engineering of conducting operations, and economics of costing operations.

FOR 3006 Forest Management 4 ch (3C 6L) Continuation of FOR 3005. Introduction to linear programming in forest management. Introduction to elements of resource modelling and productivity assessment (e.g. water flow) at the stand level. Analysis of the impact of alternative interventions at the operational level and their integration with strategic and tactical plans, including: financial and socioeconomic evaluation of forest management and resulting value flows; and risk management for insect or pathogenic attacks and wildfire. Post-implementation assessment of activities as a critical part of the management process. Prerequisite: FOR 2006, FOR 3005, or permission of instructor.

FOR 3445 Forest Ecology: Populations and Communities 4 ch (3C 3L) To understand and link processes acting on individuals, populations, and communities in space and time. To predict the response of individuals, populations, and communities to disturbance and to understand the implications of such responses for management of populations, communities, and ecosystems. Prerequisite: FOR 2420, 2505.

FOR 3456 Forest Watershed and Forest Fire Management 3 ch (2C 3L) Emphasizes the principles of management of watersheds and fire at the stand and landscape level. Influences of climate, topography/terrain, and stand and fuel types are covered. Concepts of watershed conservation are introduced as well as principles and models dealing with water retention and flow, and carbon and nutrient cycling in primary forest watersheds. Fire management concepts deal with the Fire Weather Index system, the Fire Behaviour Prediction system, fire ecology, and fire management strategies, tactics and operations. Prerequisites: FOR3445 or permission of instructor.

FOR 4020 Management Practicum 8 ch (1C 3L):

Practical exercise in forest landscape management, designed to provide an opportunity to integrate skills and knowledge gained throughout the program. Forest Ecosystem Management and Forest Engineering students will work on the same project to design landscape management plans at the strategic, tactical and operational levels. The practicum will be based on real forests. Through consultation with clients and/or members of the public, goals will be developed. Plans will be derived to integrate these goals. Teams will be responsible for project management, including planning, budgeting and report preparation.

FOR 4096 Forest Landscape Design and Management 5 ch (3C 3L Integrates value-flow planning with landscape planning by: 1) introducing students to the concepts and techniques used in dealing with the spatial dimensions in forest management planning; 2) introducing students to the difficulties involved with management for a complex set of demands, where resources demanded have production functions that include complex spatial and temporal relationships of inputs, many of which are unknown, and 3) exposing students to techniques available to forecast landscape patterns resulting from flow driven management planning, and to design landscape patterns based on analysis of natural dynamics. Prerequisite: FOR 3006, or permission of instructor.

FOR 4625 Integrated Management of Insects and Fungi 4 ch (3C 3L).

FOR 4992 Individual Project I 3ch.

Elective Courses:

FOR 2265 Computer Programming for Forestry 3 ch.
FOR 2286 GIS IN FORESTRY II 3 ch (3L).
FOR 2933 Bioethics in Forestry 2 ch 3 ch (3C).
FOR 2946 Bioethics, Emotional Intelligence, and the Nature of Spirituality 3 ch (3C).
FOR 3853 Problem-Solving and Interpersonal Communication 3 ch (3C/S) Designed to help develop skills in solving problems and communicating with others. Models will be presented and used. Emphasizes student participation and leadership.

FOR 4013 Basic Woodlot Management 3 ch (3C).

Introduction to basic woodlot management, covering such topics as planning, harvesting, Silviculture, Christmas trees, maple products, wildlife and recreation, economics, owner characteristics and organization, government programs and policies and industry relations as they relate to small woodlots. Prerequisite: Open to 4th- and 5th-year Faculty of Forestry and Environmental Management students, or permission of instructor.

Conclusion

This brief comparative survey stretches from the certificate study level of forestry to undergraduate levels, at university. The reason is that there appears, in many countries, to be a limited number of learning programs in "pure" forestry outside the universities and Higher Education.

Despite this, as explained, the forestry learning infrastructure in New Zealand is wide, all-encompassing and very instructional as an example to be followed.

Similarities: Broadly speaking the topics are similar on key or core components of study, as demonstrated by the topics and the learning areas and or subjects covered. There are subjects in the countries under review that resemble South Africa's Critical Cross Field Outcomes (CCFO's). Examples are problems solving, as well as other subjects in the filed of life skills like Emotional Intelligence (IQ).

Differences:

In many countries, the subject of forestry is studied at Higher Education Level. In addition, the advanced nature of countries in the developed world is shown by the inclusion for study of subjects like Geographic Information Systems (GIS) for easy spatial location in the forest. The subject of Bio-ethics is included to strengthen the case for an integrated view of the universe.

ARTICULATION OPTIONS
This Qualification articulates both horizontally and vertically.

Horizontal articulation:

> Further Education and training Certificate: New Venture Creation (SMME), NQF Level 4.

Vertical articulation:

> ID 17499: National Certificate: Forestry, NQF Level 5.
> ID 17496: National Diploma: Forestry, NQF Level 5.
> ID 19248: National Certificate in Forestry, NQF Level 5.
> 2069: National Higher Certificate: Forestry, NQF Level 5.

MODERATION OPTIONS
> Anyone assessing a learner or moderating the assessment of a learner against the qualification must be registered as an assessor with the relevant Education, Training, Quality, Assurance (ETQA) Body, or with an ETQA that has a Memorandum of Understanding 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 Education, Training, Quality, Assurance (ETQA) Body, or with an ETQA that has a Memorandum of Understanding with the relevant ETQA.

> Assessment and moderation of assessment will be overseen by the relevant Education, Training, Quality, Assurance (ETQA) Body, or by an ETQA that has a Memorandum of Understanding with the relevant ETQA, according to the ETQA`s policies and guidelines for assessment and moderation.

> Moderation must include both internal and external moderation of assessments, unless ETQA policies specify otherwise. Moderation should also encompass achievement of the competence described in the associated unit standards.

> Anyone wishing to be assessed against this qualification may apply to be assessed by any assessment agency, assessor or provider institution that is accredited by the relevant ETQA.

CRITERIA FOR THE REGISTRATION OF ASSESSORS
Criteria for registration of assessors:

Anyone assessing a learner against this qualification must be registered with the relevant ETQA as an assessor.

Any institution offering learning that will enable the achievement this qualification must be accredited as a provider with the relevant ETQA. Assessment will be overseen by the relevant ETQA according to the policies and guidelines for assessment of that ETQA, in terms of agreements reached around assessment and between various ETQA's (including professional bodies).

Anyone wishing to be assessed against this qualification may apply to be assessed any assessment agency, assessor or provider institution that is accredited by the relevant ETQA.

The options as listed above provide the opportunity to ensure that assessment and moderation can be transparent, affordable, valid reliable and non-discriminatory.

For an applicant to register as an assessor or moderator of this qualification, the applicant needs:

> To be registered as an assessor with the relevant ETQA.
> To be in possession of the relevant qualification.
> To have sufficient relevant experience.
> To have the appropriate qualification to assess Communication and Mathematical Literacy.

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	119470	Evaluate literary texts	Level 4	5
Fundamental	119469	Read/view, analyse and respond to a variety of texts	Level 4	5
Fundamental	9016	Represent analyse and calculate shape and motion in 2- and 3-dimensional space in different contexts	Level 4	4
Fundamental	119471	Use language and communication in occupational learning programmes	Level 4	5
Fundamental	7468	Use mathematics to investigate and monitor the financial aspects of personal, business, national and international issues	Level 4	6
Fundamental	119459	Write/present/sign for a wide range of contexts	Level 4	5
Core	13223	Apply safety, health and environmental protection procedures	Level 3	6
Core	117085	Conduct basic forestry map reading	Level 3	2
Core	263815	Demonstrate understanding of the principles of Forest Engineering practices	Level 4	5
Core	263760	Demonstrate understanding of the principles of Silviculture and fire protection	Level 4	5
Core	14667	Describe and apply the management functions of an organization	Level 4	10
Core	242810	Manage Expenditure against a budget	Level 4	6
Elective	116275	Apply routine maintenance and servicing plans and procedures	Level 3	3
Elective	13915	Demonstrate knowledge and understanding of HIV/AIDS in a workplace, and its effects on a business sub-sector, own organisation and a specific workplace	Level 3	4
Elective	119515	Develop networks for development practice	Level 3	6
Elective	263819	Apply knowledge of manual and mechanized harvesting and transport systems	Level 4	5
Elective	110053	Conduct a basic community needs assessment	Level 4	12
Elective	263817	Cost Silviculture operations	Level 4	4
Elective	263816	Cost harvesting and transport operations	Level 4	4
Elective	263840	Demonstrate knowledge of nursery practices including seedling	Level 4	3
Elective	123240	Demonstrate knowledge of silviculture in commercial forestry	Level 4	20
Elective	115591	Explain and apply environmental legal principles, rights, duties and responsibilities to a specific work context	Level 4	6
Elective	114584	Finance a new venture	Level 4	5
Elective	263836	Identify possible community initiatives	Level 4	5

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Elective	123232	Lead a strike attack force to contain or extinguish a wildfire	Level 4	4
Elective	123231	Manage a crew during wildfire suppression	Level 4	7
Elective	114586	Manage finances of a new venture	Level 4	5
Elective	13948	Negotiate an agreement or deal in an authentic work situation	Level 4	5
Elective	14920	Participate in groups and/or teams to recommend solutions to problems	Level 4	3
Elective	123230	Perform administrative functions during wildfire suppression	Level 4	4
Elective	263838	Prepare an operational Silviculture plan	Level 4	3
Elective	117070	Prepare an operational harvest plan	Level 4	4
Elective	114592	Produce business plans for a new venture	Level 4	8
Elective	263834	Supervise aerial extraction systems and fire protection	Level 4	3
Elective	263835	Supervise maintenance of forest roads	Level 4	3
Elective	10981	Supervise work unit to achieve work unit objectives (individuals and teams)	Level 4	12
Elective	114593	Tender to secure business for a new venture	Level 4	5

LEARNING PROGRAMMES RECORDED AGAINST THIS QUALIFICATION
None

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate understanding of the principles of Silviculture and fire protection

SAQA US ID	*UNIT STANDARD TITLE*		
263760	Demonstrate understanding of the principles of Silviculture and fire protection		
ORIGINATOR		*PROVIDER*	
SGB Forestry			
FIELD		*SUBFIELD*	
1 - Agriculture and Nature Conservation		Forestry and Wood Technology	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 4	5

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

SPECIFIC OUTCOME 1
Describe the establishment and re-establishment of plantations.

SPECIFIC OUTCOME 2
List and briefly describe the different aspects of plantation maintenance.

SPECIFIC OUTCOME 3
List and briefly describe the pruning and thinning process.

SPECIFIC OUTCOME 4
Briefly describe fire protection measures practiced in the Forestry Industry.

SPECIFIC OUTCOME 5
Briefly describe the elements of Silviculture planning.

SPECIFIC OUTCOME 6
Demonstrate an understanding of the Safety, Health, Environmental and Quality standards framework within which Silvicultural and Fire Protection practices are applied.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	66349	Further Education and Training Certificate: General Forestry	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate understanding of the principles of Forest Engineering practices

SAQA US ID	*UNIT STANDARD TITLE*		
263815	Demonstrate understanding of the principles of Forest Engineering practices		
ORIGINATOR		*PROVIDER*	
SGB Forestry			
FIELD		*SUBFIELD*	
1 - Agriculture and Nature Conservation		Forestry and Wood Technology	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 4	5

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

SPECIFIC OUTCOME 1
List and briefly describe the components of the Harvesting Process.

SPECIFIC OUTCOME 2
Demonstrate an understanding of the Safety, Health, Environmental and Quality standards framework within which Forest Engineering practices are applied.

SPECIFIC OUTCOME 3
List and briefly discuss relevant timber transport systems.

SPECIFIC OUTCOME 4
Briefly describe the different elements involved in the management of roads within plantations.

SPECIFIC OUTCOME 5
Describe the application of fundamental ergonomics in Forestry Engineering.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	66349	Further Education and Training Certificate: General Forestry	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Cost harvesting and transport operations

SAQA US ID	*UNIT STANDARD TITLE*		
263816	Cost harvesting and transport operations		
ORIGINATOR		*PROVIDER*	
SGB Forestry			
FIELD		*SUBFIELD*	
1 - Agriculture and Nature Conservation		Forestry and Wood Technology	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 4	4

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

SPECIFIC OUTCOME 1
List and explain the key requirements for a harvesting or transport operation for costing tasks.

SPECIFIC OUTCOME 2
Identify resources required for each task identified.

SPECIFIC OUTCOME 3
Determine rates for the individual tasks according to operative company procedure e.g. R/ton.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66349	Further Education and Training Certificate: General Forestry	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Cost Silviculture operations

SAQA US ID	*UNIT STANDARD TITLE*		
263817	Cost Silviculture operations		
ORIGINATOR		*PROVIDER*	
SGB Forestry			
FIELD		*SUBFIELD*	
1 - Agriculture and Nature Conservation		Forestry and Wood Technology	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 4	4

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

SPECIFIC OUTCOME 1
List the tasks required, production standards and quantities involved in a particular Silviculture operation.

SPECIFIC OUTCOME 2
Identify resources required for each task identified.

SPECIFIC OUTCOME 3
Determine rates for the individual tasks according to a standardized measure e.g. R/hectare.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66349	Further Education and Training Certificate: General Forestry	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Apply knowledge of manual and mechanized harvesting and transport systems

SAQA US ID	*UNIT STANDARD TITLE*		
263819	Apply knowledge of manual and mechanized harvesting and transport systems		
ORIGINATOR		*PROVIDER*	
SGB Forestry			
FIELD		*SUBFIELD*	
1 - Agriculture and Nature Conservation		Forestry and Wood Technology	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 4	5

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

SPECIFIC OUTCOME 1
Explain the appropriate process to follow when assigned a particular area of trees to be harvest.

SPECIFIC OUTCOME 2
Explain relevant safety, health, environmental and quality considerations to be applied in terms of industry norms and statutory requirements.

SPECIFIC OUTCOME 3
Describe the appropriate production, Safety Health Environment and Quality (SHEQ) control measures to be applied in order to achieve the given task.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66349	Further Education and Training Certificate: General Forestry	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Supervise aerial extraction systems and fire protection

SAQA US ID	*UNIT STANDARD TITLE*		
263834	Supervise aerial extraction systems and fire protection		
ORIGINATOR		*PROVIDER*	
SGB Forestry			
FIELD		*SUBFIELD*	
1 - Agriculture and Nature Conservation		Forestry and Wood Technology	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 4	3

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

SPECIFIC OUTCOME 1
Implement the approved felling plan in accordance with company operating procedures.

SPECIFIC OUTCOME 2
Set up the extraction system in terms of extraction plan.

SPECIFIC OUTCOME 3
Supervise extraction process in relation to extraction plan.

SPECIFIC OUTCOME 4
Maintain machines and equipment in accordance with maintenance schedule.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66349	Further Education and Training Certificate: General Forestry	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Supervise maintenance of forest roads

SAQA US ID	*UNIT STANDARD TITLE*		
263835	Supervise maintenance of forest roads		
ORIGINATOR		*PROVIDER*	
SGB Forestry			
FIELD		*SUBFIELD*	
1 - Agriculture and Nature Conservation		Forestry and Wood Technology	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 4	3

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

SPECIFIC OUTCOME 1
Identify road maintenance priorities and formulate maintenance plan.

SPECIFIC OUTCOME 2
Implement the maintenance plan in accordance with the maintenance program.

SPECIFIC OUTCOME 3
Adhere to relevant Standard Operating Procedures (SOP) and regulatory requirements.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66349	Further Education and Training Certificate: General Forestry	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Identify possible community initiatives

SAQA US ID	*UNIT STANDARD TITLE*		
263836	Identify possible community initiatives		
ORIGINATOR		*PROVIDER*	
SGB Forestry			
FIELD		*SUBFIELD*	
1 - Agriculture and Nature Conservation		Forestry and Wood Technology	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 4	5

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

SPECIFIC OUTCOME 1
Set up community structures for liaison.

SPECIFIC OUTCOME 2
Identify potential problems and strategies to avoid them.

SPECIFIC OUTCOME 3
Facilitate community meeting.

SPECIFIC OUTCOME 4
Explain where and how funds can be acquired.

SPECIFIC OUTCOME 5
Demonstrate knowledge of the relevant legislation.

SPECIFIC OUTCOME 6
Identify commercial opportunities for communities within the forestry.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66349	Further Education and Training Certificate: General Forestry	Level 4

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Prepare an operational Silviculture plan

SAQA US ID	*UNIT STANDARD TITLE*		
263838	Prepare an operational Silviculture plan		
ORIGINATOR		*PROVIDER*	
SGB Forestry			
FIELD		*SUBFIELD*	
1 - Agriculture and Nature Conservation		Forestry and Wood Technology	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 4	3

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

SPECIFIC OUTCOME 1
Explain the purpose of a Silviculture plan.

SPECIFIC OUTCOME 2
Describe the individual processes and time frame of a typical Silvicultural Process planning.

SPECIFIC OUTCOME 3
Collect data for the preparation of an operational Silviculture plan.

SPECIFIC OUTCOME 4
Describe and list typical resource requirements for a Silvicultural Operational Plan.

QUALIFICATIONS UTILISING THIS UNIT STANDARD
None

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate knowledge of nursery practices including seedling

SAQA US ID	*UNIT STANDARD TITLE*		
263840	Demonstrate knowledge of nursery practices including seedling		
ORIGINATOR		*PROVIDER*	
SGB Forestry			
FIELD		*SUBFIELD*	
1 - Agriculture and Nature Conservation		Forestry and Wood Technology	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 4	3

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

SPECIFIC OUTCOME 1
Supervise nursery processes.

SPECIFIC OUTCOME 2
Monitor seed or cut material for planting in a nursery.

SPECIFIC OUTCOME 3
Supervise germination in a nursery.

SPECIFIC OUTCOME 4
Make decisions on germinating seed and cut material for healthy development in line with species.

SPECIFIC OUTCOME 5
Monitor handling of product for dispatch.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66349	Further Education and Training Certificate: General Forestry	Level 4

No. 328 **27 March 2009**

SOUTH AFRICAN QUALIFICATIONS AUTHORITY (SAQA)

In accordance with Regulation 24(c) of the Regulations of 28 March 1998, the Task Team for

Adult Learning

registered by Organising Field 05 – Education, Training and Development, publishes the following Unit Standards for public comment.

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

Comment on the Unit Standards should reach SAQA at the address ***below and no later than 27 April 2009.*** All correspondence should be marked **Standards Setting – Task Team for Adult Learning** addressed to

The Director: Standards Setting and Development
SAQA
Attention: Mr. E. Brown
Postnet Suite 248
Private Bag X06
Waterkloof
0145
or faxed to 012 – 431-5144
e-mail: ebrown@saqa.org.za

D. MPHUTHING
ACTING DIRECTOR: STANDARDS SETTING AND DEVELOPMENT

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate knowledge and understanding of issues of diversity in a specific South African context

SAQA US ID	*UNIT STANDARD TITLE*		
263918	Demonstrate knowledge and understanding of issues of diversity in a specific South African context		
ORIGINATOR		*PROVIDER*	
Task Team - Adult Learning			
FIELD		*SUBFIELD*	
5 - Education, Training and Development		Adult Learning	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 4	5

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

SPECIFIC OUTCOME 1
Explore global issues of identity in historical contexts.

SPECIFIC OUTCOME 2
Analyse how historical experience has impacted on South Africa's diverse society.

SPECIFIC OUTCOME 3
Explore how personal attributes and behaviour influence interactions in the context of diversity.

SPECIFIC OUTCOME 4
Demonstrate strategies for dealing with issues of diversity.

QUALIFICATIONS UTILISING THIS UNIT STANDARD
None

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Apply knowledge of issues of diversity in a specific South African context

SAQA US ID	*UNIT STANDARD TITLE*		
263936	Apply knowledge of issues of diversity in a specific South African context		
ORIGINATOR		*PROVIDER*	
Task Team - Adult Learning			
FIELD		*SUBFIELD*	
5 - Education, Training and Development		Adult Learning	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 5	5

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

SPECIFIC OUTCOME 1
Demonstrate understanding of the underlying dynamics that give rise to perceptions of diversity.

SPECIFIC OUTCOME 2
Apply knowledge of psycho-social factors that have relevance for inter-group relationships.

SPECIFIC OUTCOME 3
Investigate differences in privilege and power among members of a specific community/organisation.

SPECIFIC OUTCOME 4
Propose a course of action to bring about change in a select group/community.

QUALIFICATIONS UTILISING THIS UNIT STANDARD
None

No. 329 **27 March 2009**

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

Chemical Industries

registered by Organising Field 06 – Manufacturing, Engineering & 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 27 April 2009.*** All correspondence should be marked **Standards Setting – SGB for Chemical Industries** and addressed to

The Director: Standards Setting and Development
SAQA
Attention: Mr. E. Brown
Postnet Suite 248
Private Bag X06
Waterkloof
0145
or faxed to 012 – 431-5144
e-mail: ebrown@saqa.org.za

D. MPHUTHING
ACTING DIRECTOR: STANDARDS SETTING AND DEVELOPMENT

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:
National Certificate: Chemical Operations

SAQA QUAL ID	*QUALIFICATION TITLE*		
66209	National Certificate: Chemical Operations		
ORIGINATOR		*PROVIDER*	
Chemical Industries SGB			
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
22867	National Certificate: Chemical Systems Operations	Level 3	122	Will occur as soon as 66209 is registered
48916	National Certificate: Explosives Manufacturing Operations	Level 3	120	Will occur as soon as 66209 is registered
58537	National Certificate: Chemical Operations	Level 3	120	Will occur as soon as 66209 is registered

PURPOSE AND RATIONALE OF THE QUALIFICATION
Purpose:

This qualification addresses the training needs of learners wishing to progress beyond NQF Level 2 in chemical process operations. The competence obtained from this qualification provides the foundation needed to take responsibility for a significant process in the chemical operations industry. It also provides the basis upon which further related learning and career development can take place.

Through the employment of competent operating personnel, employers and, in turn, the field and sub-field have confidence that this critical work in the industry is efficiently carried out.

Social development and economic transformation are enhanced through efficient production. Career development and personal job satisfaction of operating personnel are facilitated through the learning process used to achieve the competency specified.

Qualifying learners will:

> Understand the various process operations that are used in chemical operations. Understand the principles of chemistry and physics and its application in industry.
> Apply problem solving strategies in a process environment.
> Monitor and control chemical process operations in a process environment.
> Maintain quality in a processing environment.
> Understand and apply safety, health and environmental issues in the workplace.

Rationale:

This qualification is the third in a series of four qualifications aimed at people working in the chemical operations industry. The chemical processing industry is well established in South Africa and its success is dependent upon the efficient production of chemical products. A substantial number of people with applicable workplace-based skills and the correct theoretical foundation are needed to ensure that these production units in South Africa operate productively. Achieving this objective is supported directly by this qualification.

Typical learners are operating personnel working in any of the processing plants found in the broad chemical, petrochemical, minerals processing, refinery, explosives, fertiliser and other related processing industries. The qualification makes provision for some specialisation in these fields.

Competence in chemical process operations requires appropriate general, chemical specific, technical and other knowledge and its application, as well as expertise in operating production equipment and controlling a chemical process. This knowledge and expertise can form a basis for further learning particularly in the production/operational, engineering and supervisory aspects of chemical operations and similar industries in the chemical and other sectors.

RECOGNIZE PREVIOUS LEARNING?
Y

LEARNING ASSUMED IN PLACE
It is assumed that learners are already competent in:

> Communication at NQF Level 3.
> Mathematical Literacy at NQF Level 3.

Recognition of Prior Learning:

Recognition of prior learning must be carried out in accordance with the policy and rules specified and used by the ETQA responsible for evaluation of people seeking RPL for a part of the whole qualification.

Access to the Qualification:

> Access to this qualification is open. However, it is preferable that learners have completed the National Certificate in Chemical Operations, NQF Level 2.

Access for learners with disabilities is dependent on the:

> Type and severity of the disability.
> Nature of the operational processes and requirements of the equipment.

QUALIFICATION RULES
In the compulsory Fundamental Component of the qualification, a learner must demonstrate his/her competence in the unit standards totalling 20 credits plus Mathematical Literacy unit standards totalling 16 credits.

The unit standards in the compulsory Core Component of the qualification reflect the skills and competencies needed for building expertise in the chemical operations field. In the Core Component, the learner must demonstrate his/her competence in the unit standards totalling 59 credits.

The Elective component of the qualification is made up of the following specialisations:

General chemical industry specialisation:

Learners wishing to complete this specialisation must select the following unit standards with 15 credits:

> ID 263495: Monitor and control the production of chemicals in a chemical process plant, NQF Level 3, 15 credits.

Explosives industry specialisation:

Learners wishing to complete this specialisation must select at least one of the following unit standards of 15 credits:

> ID 263494: Monitor and control the manufacturing of ammonium nitrate based explosives, NQF Level 3, 15 credits.
> ID 263619: Monitor and control the manufacturing of explosives accessories, NQF Level 3, 15 credits.
> ID 263515: Monitor and control the manufacturing of initiating devices, NQF Level 3, 15 credits.
> ID 263574: Monitor and control the manufacturing of propellants, NQF Level 3, 15 credits.
> ID 263574: Monitor and control the manufacturing of small arms ammunition, NQF Level 3, 15 credits.

Sulphuric acid specialisation:

Learners wishing to complete this specialisation must select at least one of the following unit standards of 15 credits:

> ID 263617: Monitor and control pyrite processing within a sulphuric acid production plant, NQF Level 3, 15 credits.
> ID 263635: Monitor and control the pyrite roasting process, NQF Level 3 15 credits.
> ID 263616: Monitor and control the sulphuric acid production process, NQF Level 3, 15 credits.

Mineral extraction and refining specialisation:

Learners wishing to complete this specialisation must select at least one of the following unit standards of 15 credits:

> ID 263454: Monitor and control the base metal leaching process, NQF Level 3, 15 credits.
> ID 263595: Monitor and control the platinum group metals preparation process, NQF Level 3, 15 credits.
> ID 263636: Monitor and control an electrowinning process, NQF Level 3, 15 credits.
> ID 263577: Monitor and control a crystallisation process, NQF Level 3, 15 credits.
> Monitor and control the cobalt production process, NQF Level 3, 15 credits.
> ID 263594: Monitor and control the nickel production process, NQF Level 3, 15 credits.
> ID 263614: Monitor and control the platinum group metals recovery process, NQF Level 3, 15 credits.
> ID 263614: Monitor and control the platinum group metals separation process, NQF Level 3, 15 credits.
> ID 263618: Monitor and control the platinum group metal purification process, NQF Level 3, 15 credits.
> ID 263634: Monitor and control the conversion of platinum group metal salts into final metal products, NQF Level 3, 15 credits.
> ID 263595: Monitor and control the platinum group metals supporting processes, NQF Level 3, 15 credits.

Electives:

The qualification is completed by selecting sufficient credits from this section to make up 120 credits.

The Elective Component of the qualification requires the learner to select additional general application Unit Standards covering aspects such as quality, sampling, computer, mechanical and maintenance support skills. In total the learner must demonstrate his/her competence in a minimum of 25 credits selected from the Elective component.

EXIT LEVEL OUTCOMES

1. Apply problem solving strategies in a process environment.

2. Apply safety and environmental protection procedures in the workplace.

3. Manage and control chemical process operations in a process environment.

4. Maintain quality in a processing environment.

Critical Cross-Field Outcomes:

While performing integrated chemical process operations, qualifying learners can:

Identify and solve problems in which response displays that responsible decisions, using critical and creative thinking, have been made by:

Responding to emergencies in a processing environment:

Refer to the following Exit Level Outcome(s):

> Apply safety and environmental protection procedures in the workplace.

Monitoring and controlling quality assurance practices:

Refer to all Exit Level Outcomes.

Applying operating procedures:

Refer to the following Exit Level Outcome(s):

> Manage and control chemical process operations in a process environment.
> Maintain quality in a processing environment.

Controlling variables impacting on chemical process operations:

Refer to all Exit Level Outcomes.

Work effectively with others as a member of a team, group, organisation or community by:

Working in a coordinated team during processing operations:

Refer to the following Exit Level Outcomes:

> Manage and control chemical process operations in a process environment.

Co-ordinating one's work with that of others in the direct surrounding area, internal and external operations; Evident in all Exit Level Outcomes.

Organise and manage oneself and one's activities responsibly and effectively by:

Using operating instructions to control process plant conditions:

Refer to the following Exit Level Outcome:
> Manage and control chemical process operations in a process environment.

Implementing the steps to solve operating problems in a process plant:

Refer to the following Exit Level Outcome(s):

> Apply problem solving strategies in a process environment.
> Manage and control chemical process operations in a process environment.

Applying quality procedures in a process environment to maintain product quality:

Refer to the following Exit Level Outcome(s):

> Apply problem solving strategies in a process environment.
> Maintain quality in a processing environment.

Collect, analyse, organise and critically evaluate information by:

Monitoring operational parameters:

Refer to the following Exit Level Outcome(s):

> Apply problem solving strategies in a process environment.
> Manage and control chemical process operations in a process environment.
> Maintain quality in a processing environment.

Collating and sorting product quality data:

Refer to the following Exit Level Outcome(s):

> Apply problem solving strategies in a process environment.
> Manage and control chemical process operations in a process environment.
> Maintain quality in a processing environment.

Monitoring and interpreting product quality data and data obtained from product analysis:

Refer to the following Exit Level Outcome(s):

> Apply problem solving strategies in a process environment.
> Manage and control chemical process operations in a process environment.
> Maintain quality in a processing environment.

Managing records, reports and stock:

>Refer to all Exit Level Outcomes.

Communicate effectively by using mathematical and/or language skills in the modes of oral and/or written presentations by:

Recording and interpretation of instrument readings:

Refer to the following Exit Level Outcome(s):

> Apply problem solving strategies in a process environment.
> Manage and control chemical process operations in a process environment.
> Maintain quality in a processing environment.

Preparing and presenting reports:

Refer to the following Exit Level Outcome(s):

> Apply problem solving strategies in a process environment.
> Manage and control chemical process operations in a process environment.
> Maintain quality in a processing environment.

Use science and technology effectively and critically, showing responsibility towards the environment and health of others by:

Working according to health and safety regulations:

> Refer to all Exit Level Outcomes.

Controlling technologically advanced production equipment according to operating procedures:

> Refer to all Exit Level Outcomes.

Working and interpreting technologically advanced instrumentation and computer systems:

> Refer to all Exit Level Outcomes.

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

Monitoring and controlling quality assurance practices:

Refer to the following Exit Level Outcome(s):

> Manage and control chemical process operations in a process environment.
> Maintain quality in a processing environment.

Adjusting equipment and machinery while taking cognisance of the downstream impact:

Refer to the following Exit Level Outcome(s):

> Apply problem solving strategies in a process environment.
> Manage and control chemical process operations in a process environment.
> Maintain quality in a processing environment.

Contribute to the full personal development of each learner and the social and economic development of the society at large by:

Maintaining and applying safety practices in the production environment:

> Refer to all Exit Level Outcomes.

Maintaining and applying quality practices in the production environment:

Refer to the following Exit Level Outcome(s):

> Manage and control chemical process operations in a process environment.
> Maintain quality in a processing environment.

Performing core operating functions:

Evident in Exit Level Outcome(s):

> Manage and control chemical process operations in a process environment.

Performing specialised computer functions:

Refer to the following Exit Level Outcome(s):

> Apply problem solving strategies in a process environment.
> Manage and control chemical process operations in a process environment.
> Maintain quality in a processing environment.

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

1.1 Statistical process control is performed in a process environment.
1.2 Instrument control loops are identified and interpreted in accordance with specified requirements.
1.3 Operating problems in a process plant are addressed in accordance with specifications.

Associated Assessment Criteria for Exit Level Outcome 2:

2.1 Emergencies in a process environment are responded to in accordance with specified requirements.
2.2 The work permit system is explained and applied in accordance with organisational requirements.

Associated Assessment Criteria for Exit Level Outcome 3:

3.1 The principles of chemistry and physics are explained in relation to a processing environment.
3.2 Operating instructions are used to control process plant conditions.
3.3 Statistical process control is performed in accordance with specifications.
3.4 Solid-vapour and liquid-vapour separation processes are explained with examples.
3.5 Plant is monitored in a process environment in accordance with specified requirements.
3.6 Process and instrument diagrams are read and interpreted in accordance with code of practice.
3.7 Instrument control loops are identified and interpreted in accordance with specifications.

Associated Assessment Criteria for Exit Level Outcome 4:

4.1 On-site analysis of process materials is conducted in accordance with requirements.

4.2 The quality of products is maintained in a production environment.
4.3 Statistical process control is performed in accordance with specifications.

Integrated Assessment:

The applied competence (practical, foundational and reflexive competencies) of this qualification *will be achieved if a learner is able to achieve all the exit level outcomes of this qualification.*

Appropriate methods and tools must be used to assess practical, foundational and reflexive competence of the learner in all the exit level outcomes listed above, as well as to determine a learner's ability to solve problems, work in a team, organize him/herself, use applied science, and understand the implications of actions and reactions in the world as a set of related systems. Such an assessment process will determine development of the whole person, and the integration of applied knowledge and skills.

Assessors should develop, conduct, and ensure integration of, assessment by making use of a range of formative and summative assessment methods against the unit standards that make up the qualification. Combinations of applied, foundational and reflective competencies, including critical cross-field outcomes, should be assessed wherever possible.

Moderators should ensure that assessment is valid, consistent and integrated into work or learning, and that there is sufficient and authenticated evidence of learner competence against the whole qualification.

INTERNATIONAL COMPARABILITY
National Certificate: Chemical Operations was compared with the German Berufschule chemical operations qualifications, the NVQ from Britain, the Australian and New Zealand Qualifications Frameworks.

African countries with manufacturing facilities (including SADC countries) were scanned for applicable qualifications or training programmes, but no relevant qualifications are offered in any of these countries.

Good international comparability, including similar core qualification structures and progressions from NQF Level 1 to NQF Level 4, were found in the Australian and British qualifications.

Both local and international qualifications place high emphasis on safety with a range of unit standards relating to hazards, emergencies and environmental protection included.

The Chemical Operations Qualification compares well with the best international qualifications and training programmes offered. The compulsory problem solving, quality control and operations content incorporated in the qualification will serve to support qualifying learners to make better informed, autonomous decisions within a more compact timeframe than international learners and will increase transportability of the qualification considerably.

An extensive international comparability was done which included the United States of America, Australia, New Zealand, Germany, Britain, European Community Chemical Operator Project and relevant African countries.

United States of America:

In the USA training for chemical process operators is generally considered as on-the-job training with some specialised multi-media and simulator-training modules offered by private providers. However a small number of technical colleges offer certificate programmes, which are very similar in design to the Chemical Operations NQF Level 3 and 4 qualifications.

Germany:

The German two year "Produktionsfachkraft Chemie" (Chemical Production Specialist) qualification was used as basis for the development of the NQF Level 1 and NQF Level 2 Chemical Operations qualifications. Our NQF Level 3 qualification was designed to deliver continued training in external operations as required by the chemical industry in South Africa.

The Australian and British qualifications registered respectively on the AQF and the NVQ were also used as benchmarking partners. A comparison of the qualifications was undertaken and the best practice points were used in the generation of the South African qualification's unit standards, including similar core qualification structures and progressions from NQF Level 1 to NQF Level 4.

Britain:

A comparison with the British qualification was included, because the British chemical industry is very well developed and the NVQ is an educational structure comparable to the NQF. An Internet search revealed that The City & Guilds Level 3 NVQ in Chemical, Pharmaceutical and Petro-Chemical Manufacture provides for the following areas of specialisation: Controlling Process Operations and Technical Support. The qualification contains compulsory core units consisting of safety, teamwork, work handover and a choice of seven elective units from two separate groups. Three units must be chosen from Group, A which contains the operational units: preparing, controlling, maintaining, restoring and completing complex processing operations and quality management. Four units must be chosen from Group B which contains units ranging from cleaning and preparing equipment, SHEQ, problem solving, risk assessment, energy efficiency and quality control.

Australia:

The Australian processing industry is of a similar size and sophistication as the South African industry. For this reason a comparison with the Australian qualification was included, as well as the AQF being an educational structure comparable to the NQF. An internet search of the AQF revealed that the Australian Certificate III in Process Plant Operations contains five compulsory core units on communication, safety, emergencies, and work procedures. It allows the learner to choose elective unit standards to specialise in the following steams: Chemical and Oil, Hydrocarbons Extractions and Hydrocarbons Transmission. The qualification is made up of 21 units of competence, of which 16 have to be chosen from operations and support domains that are comparable to what is required for the local qualification, e.g. operate and monitor a range of complex processing equipment, OHS, quality maintenance and problem solving.

Africa:

African countries with processing facilities (including SADC countries) were searched for applicable qualifications or training programmes, but no relevant qualifications is offered in any of these countries.

New Zealand:

Research in the NZQA showed that a Level 2 Certificate in Energy and Chemical Plant Operations (Process Operation) and a similar Level 4 Process Operation qualifications are registered. There are no Level 3 qualifications in Process operations registered on the NZQA.

Both local and international qualifications place high emphasis on safety with a range of unit standards relating to hazards, emergencies and environmental protection included.

The Chemical Operations Qualification compares well with the best international qualifications and training programmes offered. The compulsory technical content incorporated in the qualification will serve to support qualifying learners to make better informed, autonomous decisions within a more compact timeframe than international learners and will increase transportability of the qualification considerably.

ARTICULATION OPTIONS

This qualification is the third in a series of four chemical operations qualifications and it will allow the learner a vertical progression from the NQF Level 2 qualification. The qualifying learner may progress into a NQF Level 4 supervisory internal process controller role in the chemical operations industry.

The generic knowledge and expertise enables the learner to progress horizontally in a range of other manufacturing operations or to develop a career where knowledge of chemical operations is necessary.

MODERATION OPTIONS

> Anyone moderating the assessment of learners against this Qualification must be registered as a moderator with the relevant ETQA.

> Any institution offering learning that will enable the achievement of this Qualification must be accredited or recognised as a provider with the relevant ETQA.

> Assessment and moderation 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 ETQAs (including professional bodies); and in terms of the moderation guideline detailed immediately below.

> Moderation must include both internal and external moderation of assessments at exit points of the qualification, unless ETQA policies specify otherwise. Moderation should also encompass achievement of the competence described both in individual unit standards, exit level outcomes as well as the integrated competence described in the qualification.

> Anyone wishing to be assessed against this Qualification may apply to be assessed by any assessment agency, assessor or provider institution that is accredited by the relevant ETQA.

CRITERIA FOR THE REGISTRATION OF ASSESSORS

N/A

NOTES

This qualification replaces the following qualifications:

> ID 22867: National Certificate in Chemical Systems Operation , NQF Level 3, 122 credits.
> ID 48916: National Certificate: Explosives Manufacturing Operations, Level 3, 120 credits.
> ID 58537: National Certificate: Chemical Operations, Level 3, 130 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

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
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	244241	Apply knowledge of chemical reactions in a processing environment	Level 3	6
Core	244086	Apply quality procedures in a process plant	Level 3	6
Core	244092	Demonstrate understanding of solid-vapour and surface based separation processes	Level 3	10
Core	244091	Identify and interpret instrument control loops	Level 3	8
Core	244098	Perform statistical process control in a process environment	Level 3	4
Core	244093	Read and interpret process and instrumentation diagrams	Level 3	4
Core	244085	Respond to emergencies in a process environment	Level 3	6
Core	244087	Solve operating problems in a process plant	Level 3	5
Core	244084	Use operating instructions to control process plant conditions	Level 3	10
Elective	114981	Capture numerical and text information on an electronic database	Level 2	2
Elective	244078	Demonstrate understanding of a work permit system	Level 2	3
Elective	259622	Describe the functions of the workplace health and safety representative	Level 2	3
Elective	119744	Select, use and care for engineering hand tools	Level 2	8
Elective	10255	Select, use and care for power tools	Level 2	5
Elective	244088	Act as the Safety Watcher during the performance of maintenance activities	Level 3	3
Elective	244108	Apply safety, health and environment protection procedures in a process plant	Level 3	6
Elective	244096	Conduct on-site analysis of process materials	Level 3	5
Elective	10170	Demonstrate understanding of employment relations in an organisation	Level 3	3
Elective	244090	Demonstrate understanding of the principles of kinematics in physics	Level 3	6
Elective	244095	Dismantle, assemble and install basic components in a process environment	Level 3	6
Elective	263577	Monitor and control a crystallisation process	Level 3	15
Elective	263636	Monitor and control an electrowinning process	Level 3	15
Elective	263617	Monitor and control pyrite processing within a sulphuric acid production plant	Level 3	15
Elective	263614	Monitor and control the Platinum Group Metals (PGMs) recovery process	Level 3	15
Elective	263618	Monitor and control the Platinum Group Metals purification process	Level 3	15
Elective	263454	Monitor and control the base metal leaching process	Level 3	15
Elective	263576	Monitor and control the cobalt production process	Level 3	15
Elective	263634	Monitor and control the conversion of platinum group metal salts into final metal products	Level 3	15
Elective	263497	Monitor and control the manufacturing of ammonium nitrate based explosives	Level 3	15
Elective	263619	Monitor and control the manufacturing of explosives accessories	Level 3	15
Elective	263515	Monitor and control the manufacturing of initiating devices	Level 3	15
Elective	263574	Monitor and control the manufacturing of propellants	Level 3	15
Elective	263575	Monitor and control the manufacturing of small arms ammunition	Level 3	15
Elective	263594	Monitor and control the nickel production process	Level 3	15
Elective	263595	Monitor and control the platinum group metals preparation process	Level 3	15
Elective	263615	Monitor and control the platinum group metals separation process	Level 3	15
Elective	263854	Monitor and control the platinum group metals supporting processes	Level 3	15

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Elective	263495	Monitor and control the production of chemicals in a chemical process plant	Level 3	15
Elective	263635	Monitor and control the pyrite roasting process	Level 3	15
Elective	263616	Monitor and control the sulphuric acid production process	Level 3	15
Elective	263475	Operate packaging equipment used in an explosives manufacturing environment	Level 3	8
Elective	244094	Perform and support maintenance functions	Level 3	5
Elective	119078	Use a GUI-based word processor to enhance a document through the use of tables and columns	Level 3	5
Elective	116936	Use a Graphical User Interface (GUI)-based database application to work with simple databases	Level 3	3
Elective	116940	Use a Graphical User Interface (GUI)-based spreadsheet application to solve a given problem	Level 3	6

LEARNING PROGRAMMES RECORDED AGAINST THIS QUALIFICATION
None

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Monitor and control the base metal leaching process

SAQA US ID	*UNIT STANDARD TITLE*		
263454	Monitor and control the base metal leaching process		
ORIGINATOR		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	15

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

SPECIFIC OUTCOME 1
Explain the fundamental principles applicable to the base metal leaching process.

SPECIFIC OUTCOME 2
Monitor and control the different ancillary systems interacting with the base metal leaching process.

SPECIFIC OUTCOME 3
Monitor and control the quality standards of process materials in the base metal leaching process.

SPECIFIC OUTCOME 4
Monitor and control the base metal leaching process.

SPECIFIC OUTCOME 5
Monitor the safety, health, environment, security and housekeeping aspects of the base metal leaching process.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66209	National Certificate: Chemical Operations	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Operate packaging equipment used in an explosives manufacturing environment

SAQA US ID	*UNIT STANDARD TITLE*		
263475	Operate packaging equipment used in an explosives manufacturing environment		
ORIGINATOR		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	8

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

SPECIFIC OUTCOME 1
Explain the operating principles of the packaging equipment.

SPECIFIC OUTCOME 2
Perform start-up of packaging equipment.

SPECIFIC OUTCOME 3
Monitor packaging parameters.

SPECIFIC OUTCOME 4
Monitor and maintain packaging quality.

SPECIFIC OUTCOME 5
Perform shut-down of the packaging process.

SPECIFIC OUTCOME 6
Maintain operational integrity in the packaging area.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66209	National Certificate: Chemical Operations	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Monitor and control the production of chemicals in a chemical process plant

SAQA US ID	*UNIT STANDARD TITLE*		
263495	Monitor and control the production of chemicals in a chemical process plant		
ORIGINATOR		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	15

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

SPECIFIC OUTCOME 1
Explain the fundamental principles applicable to the chemical process.

SPECIFIC OUTCOME 2
Monitor and control the different ancillary systems interacting with the chemical process.

SPECIFIC OUTCOME 3
Monitor and control the quality standards of process materials in the chemical process.

SPECIFIC OUTCOME 4
Monitor and control the chemical production process.

SPECIFIC OUTCOME 5
Monitor the safety, health, environment, security and housekeeping aspects of the chemical process.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66209	National Certificate: Chemical Operations	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Monitor and control the manufacturing of ammonium nitrate based explosives

SAQA US ID	*UNIT STANDARD TITLE*		
263497	Monitor and control the manufacturing of ammonium nitrate based explosives		
ORIGINATOR		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	15

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

SPECIFIC OUTCOME 1
Explain the fundamental principles applicable to the ammonium nitrate manufacturing process.

SPECIFIC OUTCOME 2
Monitor and control the different ancillary systems interacting with the ammonium nitrate manufacturing process.

SPECIFIC OUTCOME 3
Monitor and control the quality standards of process materials in the ammonium nitrate manufacturing process.

SPECIFIC OUTCOME 4
Monitor and control the ammonium nitrate manufacturing process.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66209	National Certificate: Chemical Operations	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Monitor and control the manufacturing of initiating devices

SAQA US ID	*UNIT STANDARD TITLE*		
263515	Monitor and control the manufacturing of initiating devices		
ORIGINATOR		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	15

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

SPECIFIC OUTCOME 1
Explain the fundamental principles applicable to the manufacturing of initiating devices.

SPECIFIC OUTCOME 2
Monitor and control the different ancillary systems interacting with the manufacturing of initiating devices.

SPECIFIC OUTCOME 3
Monitor and control the quality standards of process materials in the manufacturing of initiating devices.

SPECIFIC OUTCOME 4
Monitor and control the manufacturing of initiating devices.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66209	National Certificate: Chemical Operations	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Monitor and control the manufacturing of propellants

SAQA US ID	*UNIT STANDARD TITLE*		
263574	Monitor and control the manufacturing of propellants		
ORIGINATOR		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	15

This unit standard replaces:

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
116009	Control propellant manufacturing processes	Level 3	20	Will occur as soon as 263574 is registered

SPECIFIC OUTCOME 1
Explain the fundamental principles applicable to the manufacturing of propellants.

SPECIFIC OUTCOME 2
Monitor and control the different ancillary systems interacting with the manufacturing of propellants.

SPECIFIC OUTCOME 3
Monitor and control the quality standards of process materials in the manufacturing of propellants.

SPECIFIC OUTCOME 4
Monitor and control the manufacturing of propellants.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66209	National Certificate: Chemical Operations	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Monitor and control the manufacturing of small arms ammunition

SAQA US ID	*UNIT STANDARD TITLE*		
263575	Monitor and control the manufacturing of small arms ammunition		
ORIGINATOR		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	15

This unit standard replaces:

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
116013	Control small arms ammunition manufacturing processes	Level 3	20	Will occur as soon as 263575 is registered

SPECIFIC OUTCOME 1
Explain the fundamental principles applicable to the manufacturing of small arms ammunition.

SPECIFIC OUTCOME 2
Monitor and control the different ancillary systems interacting with the manufacturing of small arms ammunition.

SPECIFIC OUTCOME 3
Monitor and control the quality standards of process materials in the manufacturing of small arms ammunition.

SPECIFIC OUTCOME 4
Monitor and control the manufacturing of small arms ammunition.

QUALIFICATIONS UTILISING THIS UNIT STANDARD
None

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Monitor and control the cobalt production process

SAQA US ID	*UNIT STANDARD TITLE*		
263576	Monitor and control the cobalt production process		
ORIGINATOR		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	15

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

SPECIFIC OUTCOME 1
Explain the fundamental principles applicable to the cobalt reduction process.

SPECIFIC OUTCOME 2
Monitor and control the different ancillary systems interacting with the cobalt reduction process.

SPECIFIC OUTCOME 3
Monitor and control the quality standards of process materials in the cobalt reduction process.

SPECIFIC OUTCOME 4
Monitor and control the cobalt reduction process.

SPECIFIC OUTCOME 5
Monitor the safety, health, environment, security and housekeeping aspects of the cobalt reduction process.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66209	National Certificate: Chemical Operations	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Monitor and control a crystallisation process

SAQA US ID	*UNIT STANDARD TITLE*		
263577	Monitor and control a crystallisation process		
ORIGINATOR		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	15

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

SPECIFIC OUTCOME 1
Explain the fundamental principles applicable to a crystallisation process.

SPECIFIC OUTCOME 2
Monitor and control the different ancillary systems interacting with the crystallisation process.

SPECIFIC OUTCOME 3
Monitor and control the quality standards of process materials in the crystallisation process.

SPECIFIC OUTCOME 4
Monitor and control the crystallisation process.

SPECIFIC OUTCOME 5
Monitor the safety, health, environment, security and housekeeping aspects in the crystallisation plant.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66209	National Certificate: Chemical Operations	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Monitor and control the nickel production process

SAQA US ID	*UNIT STANDARD TITLE*		
263594	Monitor and control the nickel production process		
ORIGINATOR		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	15

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

SPECIFIC OUTCOME 1
Explain the fundamental principles applicable to the nickel production process.

SPECIFIC OUTCOME 2
Monitor and control the different ancillary systems interacting with the nickel production process.

SPECIFIC OUTCOME 3
Monitor and control the quality standards of process materials in the nickel production process.

SPECIFIC OUTCOME 4
Monitor and control the nickel production process.

SPECIFIC OUTCOME 5
Monitor the safety, health, environment, security and housekeeping aspects of the nickel production process.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66209	National Certificate: Chemical Operations	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Monitor and control the platinum group metals preparation process

SAQA US ID	***UNIT STANDARD TITLE***		
263595	Monitor and control the platinum group metals preparation process		
ORIGINATOR		***PROVIDER***	
Chemical Industries SGB			
FIELD		***SUBFIELD***	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	***UNIT STANDARD TYPE***	***NQF LEVEL***	***CREDITS***
Undefined	Regular	Level 3	15

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

SPECIFIC OUTCOME 1
Explain the fundamental principles applicable to the PGM production process.

SPECIFIC OUTCOME 2
Monitor and control the different ancillary systems interacting with the PGM production process.

SPECIFIC OUTCOME 3
Monitor and control the quality standards of process materials in the PGM production process.

SPECIFIC OUTCOME 4
Monitor and control the PGM production process.

SPECIFIC OUTCOME 5
Monitor the safety, health, environment, security and housekeeping aspects of the PGM production process.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66209	National Certificate: Chemical Operations	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Monitor and control the Platinum Group Metals (PGMs) recovery process

SAQA US ID	*UNIT STANDARD TITLE*		
263614	Monitor and control the Platinum Group Metals (PGMs) recovery process		
ORIGINATOR		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	15

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

SPECIFIC OUTCOME 1
Explain the fundamental principles applicable to the PGMs recovery process.

SPECIFIC OUTCOME 2
Monitor and control the different ancillary systems interacting with the PGMs recovery process.

SPECIFIC OUTCOME 3
Monitor and control the quality standards of process materials in the PGMs recovery process.

SPECIFIC OUTCOME 4
Monitor and control the PGMs recovery process

SPECIFIC OUTCOME 5
Monitor the safety, health, environment, security and housekeeping aspects of the PGMs recovery process

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66209	National Certificate: Chemical Operations	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Monitor and control the platinum group metals separation process

SAQA US ID	*UNIT STANDARD TITLE*		
263615	Monitor and control the platinum group metals separation process		
ORIGINATOR		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	15

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

SPECIFIC OUTCOME 1
Explain the fundamental principles applicable to the PGM separation process.

SPECIFIC OUTCOME 2
Monitor and control the different ancillary systems interacting with the PGM separation process.

SPECIFIC OUTCOME 3
Monitor and control the quality standards of process materials in the PGM separation process.

SPECIFIC OUTCOME 4
Monitor and control the PGM separation process.

SPECIFIC OUTCOME 5
Monitor the safety, health, environment, security and housekeeping aspects of the PGM separation process.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66209	National Certificate: Chemical Operations	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Monitor and control the sulphuric acid production process

SAQA US ID	*UNIT STANDARD TITLE*		
263616	Monitor and control the sulphuric acid production process		
ORIGINATOR		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	15

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

SPECIFIC OUTCOME 1
Explain the fundamental principles applicable to the sulphuric acid production process.

SPECIFIC OUTCOME 2
Monitor and control the different ancillary systems interacting with the sulphuric acid production process.

SPECIFIC OUTCOME 3
Monitor and control the quality standards of process materials in the sulphuric acid production process.

SPECIFIC OUTCOME 4
Monitor and control the sulphuric acid production process.

SPECIFIC OUTCOME 5
Monitor the safety, health, environment, security and housekeeping aspects of the sulphuric acid production process.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66209	National Certificate: Chemical Operations	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Monitor and control pyrite processing within a sulphuric acid production plant

SAQA US ID	*UNIT STANDARD TITLE*		
263617	Monitor and control pyrite processing within a sulphuric acid production plant		
ORIGINATOR		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	15

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

SPECIFIC OUTCOME 1
Explain the fundamental principles applicable to pyrite processing.

SPECIFIC OUTCOME 2
Monitor and control the different ancillary systems interacting with pyrite processing.

SPECIFIC OUTCOME 3
Monitor and control the quality standards of process materials in pyrite processing.

SPECIFIC OUTCOME 4
Monitor and control pyrite processing.

SPECIFIC OUTCOME 5
Monitor the safety, health, environment, security and housekeeping aspects of pyrite processing.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66209	National Certificate: Chemical Operations	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Monitor and control the Platinum Group Metals purification process

SAQA US ID	*UNIT STANDARD TITLE*		
263618	Monitor and control the Platinum Group Metals purification process		
ORIGINATOR		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	15

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

SPECIFIC OUTCOME 1
Explain the fundamental principles applicable to the PGM purification process.

SPECIFIC OUTCOME 2
Monitor and control the different ancillary systems interacting with the PGM purification process.

SPECIFIC OUTCOME 3
Monitor and control the quality standards of process materials in the PGM purification process.

SPECIFIC OUTCOME 4
Monitor and control the PGM purification process.

SPECIFIC OUTCOME 5
Monitor the safety, health, environment, security and housekeeping aspects of the PGM purification process.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66209	National Certificate: Chemical Operations	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Monitor and control the manufacturing of explosives accessories

SAQA US ID	*UNIT STANDARD TITLE*		
263619	Monitor and control the manufacturing of explosives accessories		
ORIGINATOR		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	15

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

SPECIFIC OUTCOME 1
Explain the fundamental principles applicable to the manufacturing of explosives accessories.

SPECIFIC OUTCOME 2
Monitor and control the different ancillary systems interacting with the manufacturing of explosives accessories.

SPECIFIC OUTCOME 3
Monitor and control the quality standards of process materials in the manufacturing of explosives accessories.

SPECIFIC OUTCOME 4
Monitor and control the manufacturing of explosives accessories.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66209	National Certificate: Chemical Operations	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Monitor and control the conversion of platinum group metal salts into final metal products

SAQA US ID	*UNIT STANDARD TITLE*		
263634	Monitor and control the conversion of platinum group metal salts into final metal products		
ORIGINATOR		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	15

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

SPECIFIC OUTCOME 1
Explain the fundamental principles applicable to converting PGM salts into final metal products.

SPECIFIC OUTCOME 2
Monitor and control the different ancillary systems interacting with the PGM final metals conversion process.

SPECIFIC OUTCOME 3
Monitor and control the quality standards of process materials in the PGM final metals conversion process.

SPECIFIC OUTCOME 4
Monitor and control the PGM final metals conversion process.

SPECIFIC OUTCOME 5
Monitor the safety, health, environment, security and housekeeping aspects of the PGM final metals conversion process.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66209	National Certificate: Chemical Operations	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Monitor and control the pyrite roasting process

SAQA US ID	*UNIT STANDARD TITLE*		
263635	Monitor and control the pyrite roasting process		
ORIGINATOR		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	15

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

SPECIFIC OUTCOME 1
Explain the fundamental principles applicable to the pyrite roasting process.

SPECIFIC OUTCOME 2
Monitor and control the different ancillary systems interacting with the pyrite roasting process.

SPECIFIC OUTCOME 3
Monitor and control the quality standards of process materials in the pyrite roasting process.

SPECIFIC OUTCOME 4
Monitor and control the pyrite roasting process.

SPECIFIC OUTCOME 5
Monitor the safety, health, environment, security and housekeeping aspects of the pyrite roasting process.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66209	National Certificate: Chemical Operations	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Monitor and control an electrowinning process

SAQA US ID	*UNIT STANDARD TITLE*		
263636	Monitor and control an electrowinning process		
ORIGINATOR		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	15

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

SPECIFIC OUTCOME 1
Explain the fundamental principles applicable to an electrowinning process.

SPECIFIC OUTCOME 2
Monitor and control the different ancillary systems interacting with the electrowinning process.

SPECIFIC OUTCOME 3
Monitor and control the quality standards of process materials in the electrowinning process.

SPECIFIC OUTCOME 4
Monitor and control the electrowinning process.

SPECIFIC OUTCOME 5
Monitor the safety, health, environment, security and housekeeping aspects of the electrowinning process.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	66209	National Certificate: Chemical Operations	Level 3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Monitor and control the platinum group metals supporting processes

SAQA US ID	*UNIT STANDARD TITLE*		
263854	Monitor and control the platinum group metals supporting processes		
ORIGINATOR		*PROVIDER*	
Chemical Industries SGB			
FIELD		*SUBFIELD*	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 3	15

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

SPECIFIC OUTCOME 1
Explain the fundamental principles applicable to the PGM supporting processes.

SPECIFIC OUTCOME 2
Monitor and control the different ancillary systems interacting with the PGM supporting processes.

SPECIFIC OUTCOME 3
Monitor and control the quality standards of process materials in the PGM supporting processes.

SPECIFIC OUTCOME 4
Monitor and control the PGM supporting processes.

SPECIFIC OUTCOME 5
Monitor the safety, health, environment, security and housekeeping aspects of the PGM supporting processes.

QUALIFICATIONS UTILISING THIS UNIT STANDARD
None

No. 330 **27 March 2009**

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

Aerospace Operations

registered by Organising Field 10 – Physical, Mathematical, Computer and Life Sciences, 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 27 April 2009.*** All correspondence should be marked **Standards Setting – SGB for Aerospace Operations** and addressed to

The Director: Standards Setting and Development
SAQA
Attention: Mr. E. Brown
Postnet Suite 248
Private Bag X06
Waterkloof
0145
or faxed to 012 – 431-5144
e-mail: ebrown@saqa.org.za

D. MPHUTHING
ACTING DIRECTOR: STANDARDS SETTING AND DEVELOPMENT

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:
National Diploma: Aircraft Performance Engineering

SAQA QUAL ID	*QUALIFICATION TITLE*		
66109	National Diploma: Aircraft Performance Engineering		
ORIGINATOR		*PROVIDER*	
SGB Aerospace Operations			
QUALIFICATION TYPE	*FIELD*	*SUBFIELD*	
National Diploma	10 - Physical, Mathematical, Computer and Life Sciences	Physical Sciences	
ABET BAND	*MINIMUM CREDITS*	*NQF LEVEL*	*QUAL CLASS*
Undefined	371	Level 6	Regular-Unit Stds Based

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

PURPOSE AND RATIONALE OF THE QUALIFICATION
Purpose:

The purpose of the Qualification is to provide learners and education and training providers with the standards required to satisfy the challenges of participating effectively in the Flight Operations Support environment which needs to maintain impeccable standards. The Qualification will be useful to both new entrants into the service, and existing workers in the sector. For those who have been in the workplace for a long time, this Qualification can be used in the recognition of prior learning process to assess and recognise workplace skills acquired without the benefit of formal education and training. For the new entrant, this Qualification will give them the opportunity to orient themselves within a new sector, and to develop and balance their practical skills with the essential knowledge needed to earn a formal Qualification in Flight Operational Support without formal education becoming an impassable barrier.

For education and training providers, this Qualification provides guidance for the development of appropriate learning programmes and assessment documentation. For employers, this Qualification enables skills gaps to be identified and addressed ensuring that a safe and efficient flight dispatch/support environment is supported and maintained. The combination of learning outcomes that comprise this Qualification will provide the qualifying learner with vocational knowledge and skills appropriate to the context of flight support operations. The learner will have an understanding of the flight dispatch environment and how he or she should operate within the legislative, safety and quality systems which govern it. It will also equip learners with a foundation for further intellectual development, opportunities for gainful employment and reward for contributions to society.

The Qualification aims to equip learners to produce flight dispatch/support information and monitor operational situations and flight progress in order to ensure the safe and efficient completion of a flight by providing a service which is flawless.

Rationale:

This Qualification is aimed at people who work or intend to work within a Flight Operations Support environment. Typical candidates will be either career flight dispatchers or persons

wishing to progress from other areas of flight operations in to flight dispatch work or from flight dispatch in to other areas of flight operations. In the past many practitioners in the Flight Operations Support area were denied mobility of employment, as a result of a lack of formal Qualifications.

This Qualification will also facilitate the development of a professional community of Flight Operation Support personnel who are able to contribute towards a safe and efficient environment through the application of enhanced knowledge and skills relating to the production of flight dispatch information to aircrew and the provision of in-flight tactical support. The competencies contained in this Qualification are essential for social and economic transformation, empowerment and upliftment within the Flight Operations Support environment, whilst simultaneously improving the skills base of the aerospace industry. This Qualification facilitates further learning in the aerospace operations environment as well as ensuring compatibility and compliance with international regulations and standards and industry best practice.

RECOGNIZE PREVIOUS LEARNING?
Y

LEARNING ASSUMED IN PLACE

Learners accessing the Qualification will have demonstrated competence in:

> Mathematics at NQF Level 5.
> Communication at NQF Level 5.

Recognition of Prior Learning:

The structure of this Qualification makes the Recognition of Prior Learning possible through challenging the Exit Level Outcomes and Unit Standards. This Qualification may therefore be achieved in part through the recognition of prior learning, which includes formal, informal and non-formal learning and work experience. The learner should be thoroughly briefed on the mechanism to be used and RPL assessors should provide support and guidance. Care should be taken that the mechanism used provides the learner with an opportunity to demonstrate competence and is not so onerous as to prevent learners from taking up the RPL option towards gaining a qualification.

If the learner is able to demonstrate competence in the knowledge, skills, values and attitudes implicit in this qualification and/or unit standards, the appropriate credits should be assigned to the learner. Recognition of Prior Learning will be done by means of Integrated Assessment.

Access to the Qualification:

> Access is open to all learners bearing in mind the learning assumed to be in place.

It is recommended that learners complete:

> ID 59256: National Diploma: Flight Dispatch at NQF Level 5.

QUALIFICATION RULES
The Qualification is made up of a combination of learning outcomes from Fundamental, Core and Elective components, totalling a minimum of 371 Credits.

Fundamental component:
> All Unit Standards to the value of 35 credits are compulsory.

Core component:
> All Unit Standards to the value of 315 credits are compulsory.

Elective component:

> The elective component consists of individual Unit Standards from which the learner must choose Unit Standards based on the area in which they work or in which they are interested. Learners are required to choose Unit Standards totalling a minimum of 21 credits.

EXIT LEVEL OUTCOMES

1. Demonstrate knowledge and understanding of safe processes and procedures in the field of flight operations support.

2. Produce aircraft operational support data for the safe and efficient completion of an air operation.

3. Control aircraft weight and balance.

4. Publish and provide aircraft performance and operational support data.

5. Conduct performance forensic audits to ensure flight safety and efficiency.

ASSOCIATED ASSESSMENT CRITERIA

Associated Assessment Criteria for Exit Level Outcomes 1:

1.1 The legal framework which governs flight operations support is explained in terms of requirements and minimum standards.
1.2 Non-compliant situations/scenarios are identified and evaluated in order to take action to rectify these.
1.3 Non-standard events and situations are determined in terms of their impact on flight operations and safety.

Associated Assessment Criteria for Exit Level Outcomes 2:

2.1 Aircraft performance characterises are determined in accordance with national and international requirements.
2.2 The way in which aircraft performance data shall be used is explained and discussed with operating crew and dispatchers to safely and efficiently conduct a flight.
2.3 Airport and flight path characteristics are explained in terms of aircraft performance.
2.4 Corrections are applied for the effects of aircraft configurations and atmospheric conditions.

Associated Assessment Criteria for Exit Level Outcomes 3:

3.1 Aircraft weight is accurately explained and calculated considering all the required data for the `flight and aircraft.
3.2 Aircraft basic weight is determined based on the particular aircraft involved.
3.3 Centre of gravity index is determined in order to ensure that an aircraft is loaded and trimmed for operational flight.
3.4 The human factors that can affect and influence the aircraft weight and balance are explained in order to take appropriate actions to ensure compliance.

Associated Assessment Criteria for Exit Level Outcomes 4:

4.1 South African Civil Aviation Regulations (SA-CARs) and South African Civil Aviation Technical Specifications (SA-CATS) are explained with examples.

4.2 Flight crew and operational support staff are supplied with the information required in accordance with time frames for each flight.
4.3 Balance and trim sheet data (AHM560) is produced in accordance with national and international regulations.
4.4 The produced aircraft performance and operational support data is assessed in terms of compliance with the aircraft manufacturer's structural and performance limitations.

Associated Assessment Criteria for Exit Level Outcomes 5:

5.1 Flight planning principles, aircraft performance, fuel burn characteristics, weight and trim effects are explained with examples pertaining to each aircraft type and model.
5.2 Data is gathered and extracted from aircraft monitoring system, flight schedules and planning data.
5.3 Data is analysed and utilised to identify and explain anomalies in order to correct planning reference material.
5.4 Findings are reported in order to maintain accuracy of flight planning and level of aircraft performance and observed anomalies.

Integrated Assessment:

The importance of integrated assessment is to confirm that the learner is able to demonstrate applied competence (practical, foundational and reflexive) and ensure that the purpose of this Qualification is achieved. Both formative and summative assessment methods and strategies are used to ensure that Exit Level outcomes and the purpose of this Qualification are achieved.

Formative assessment is an on-going process which is used to assess the efficacy of the teaching and learning process. It is used to plan appropriate learning experiences to meet the learner`s needs. Feedback from assessment informs both teaching and learning. If the learner has met the assessment criteria then s/he has achieved the Exit Level Outcomes of the Qualification.

Summative assessment is concerned with the judgement of the learning in relation to the Exit Level Outcomes of the Qualification. Such judgement must include integrated assessment(s) which test the learners` ability to integrate the larger body of knowledge, skills and attitudes, which are represented by the Exit Level Outcomes.

Integrated assessment must be designed to achieve the following:

> An integration of the achievement of the Exit Level Outcomes in a way that reflects a comprehensive approach to learning and shows that the purpose of the Qualification has been achieved.
> Judgement of learner performance to provide evidence of applied competence or capability.

INTERNATIONAL COMPARABILITY
The purpose of this International Comparability study is to facilitate the development of a meaningful learning path and its associated curriculum incorporating both theoretical and practical vocational skills which will ensure compatibility, comparability and compliance with existing training standards for ICAO signatories. South Africa, as a signatory to these ICAO standards is obliged to comply with ICAO Standards and Recommended Practices (ISARPS). Thus this International Comparability exercise is made directly with the ICAO Standards and NOT with training offered by individual countries.

The following countries are examples of signatories to ICAO and therefore this Qualification is indirectly compared to training and development offered in these particular countries:

> Australia.

> Brazil.
> Canada.
> Egypt.
> Germany.
> Japan.
> Kenya.
> Mauritius.
> New Zealand.
> Reunion.
> Seychelles.
> Singapore.
> Thailand.
> United Arab Emirates.
> United Kingdom.
> United States of America.

There is currently no qualification available in the SADC community, which satisfactorily addresses the international requirement for relevant formal skills and competency development within the International Civil Aviation Flight Technical Support and Flight Dispatch environments.

Certain member states have Dispatcher licensing requirements and programmes in line with ICAO requirements. However, where licensing is not a requirement ICAO prescribes that training for Dispatchers should be conducted as if it were a requirement. Currently South African Flight Dispatchers are not required to be licensed. However, the SACAA is in the process of formulating ICAO compliant regulations in respect of licensing.

Aircraft manufacturers generally provide training in performance and weight and balance so as to ensure the correct operation of their aircraft. Due to our remote geographic location, South Africa has on occasion been requested to provide training and operational support to other SADC airlines.

The requirements for flight technical support are articulated at length in:

> International Civil Aviation Organisation (ICAO) Annexes 1and 6.
> ICAO Doc 7192 Part D 1998.
> Federal Aviation Authority (FAA) Code of Federal Regulations (CFR) Part 121.
> International Air Transport Association (IATA) Operational Safety Audit Standards (IOSA), and European Aviation Safety Association (EASA) Joint Aviation Authority (JAA) JAR-OPS 1.

The deficiencies inherent in the non-application of the ICAO and IOSA Standards are highlighted when IATA member airlines seek to enter into code share agreements with other IATA member carriers. IOSA Standards address and stress at length both adherence to these training and qualification standards and the administration of such training and certification. Non-compliance on the part of a carrier being subjected to audit will negate any code share agreement being concluded.

The IOSA Standards encapsulate not only all the relevant ICAO, FAA and JAA standards and regulations but include all that which is considered by the international aviation community to be reflective of best practice, even that which exceeds the statutory requirements in some cases. European Union States, particularly the Western States, are increasingly introducing ICAO compliant training at industry level.

European Union States, particularly the Western States, are increasingly introducing ICAO compliant training at industry level.

Credibility and portability of training currently provided within South Africa is amply demonstrated by the ready acceptance internationally of successful candidates and the attendance of both European Union and Gulf based carriers at training intervention presentations.

This Qualification complies with the ICAO specifications as set out in Document 7192 part D3, which has the following subject matter:

> IATA Operations Control Flight Operations - Phase 1.
> Navigation - General.
> Aviation Meteorology.
> Radio and Radio Aids.
> Weight and Balance.
> Principles of Flight.
> Aircraft Performance.
> Flight Planning.
> Extended Twin Operations (ETOPS).
> Human Factors (Dispatcher Resource Management/Crew Resource Management).
> IATA Dangerous Goods Regulations.
> Restricted Radio Telephony Licence.
> Minimum Navigation Performance Specifications (MNPS).
> Reduced Vertical Separation Minima (RVSM).
> Alarm Notification.
> Emergency Planning.
> Air Operators Certificate.
> Categorisation of Airfield Rescue and Fire Fighting Services.
> Company Operations Manual.
> IATA Airport Handling Manual Ground Handling Agreements.
> Slot Allocation and Flow Control.
> Euro Control.

Plus:

> Organisational Ab-initio Training Programmes.
> Organisational Structured On-the-job Training, Coaching and Mentoring.
> Organisational Computerised Flight Planning.
> Organisational Annual Competency Checks.
> Organisational Recurrent Training.
> Organisational Route and Flight Deck Familiarisation Flights.

In most international airlines, the Flight Operations Technical Support is described as an Aircraft Performance Engineering and the incumbents are aeronautical engineers with university or college qualifications. There is currently no qualification available in South Africa, or the SADC community, which satisfactorily addresses the international requirement for relevant formal skills and competency development within the international civil aviation Flight Operations Technical Support environments per se.

Aircraft manufacturers generally provide training in performance and weight and balance so as to ensure the correct operation of their aircraft types. Due to our remote geographic location, South African Airways has on occasion been requested to provide such training and operational support to other SADC airlines.

Conclusion:

As an imperative to both attaining and maintaining international comparability in the context of civil aviation industry related training and qualification, the establishment of a suitable and

relevant qualification is well justified. All the contents shown above are either contained in the South African Qualification as Unit Standards or Specific Outcomes within specific Unit Standards. It must also be noted that some of the above content is also found in the learning assumed to be in place.

ARTICULATION OPTIONS
Horizontal articulation is possible with:

> ID 58579: National Diploma: Air Traffic Control, NQF Level 6.
> ID 58008: National Diploma: Aircraft Piloting, NQF Level 6.
> ID 60071: National Certificate: Engineering, NQF Level 6.
> ID 49744: National Diploma: Engineering Technology, NQF Level 6.

Vertical articulation is possible with:

> ID 64429: Bachelor of Science: Engineering, NQF Level 7.
> ID 49509: Bachelor of Technology: Engineering Technology, NQF Level 7.
> ID 63450: National Certificate: Certified Engineering, NQF Level 7.
> ID 58494: National Certificate: Forensic Engineering Investigation, NQF Level 7.

MODERATION OPTIONS
> This Qualification will be internally assessed and externally moderated by a moderator registered by the relevant accredited ETQA or an ETQA that has a Memorandum of Understanding with the accredited ETQA. Providers should establish or refine existing moderation procedures and systems at their institutions with a view to aligning them with the requirements of the relevant ETQA.

> The learner's performance/results should be moderated by one or more external moderators. Moderators should report not only on the standard of achievement but also on the validity and reliability of the assessment strategies, design and criteria in relation to the purpose and Exit Level Outcomes of the Qualification.

> Moderators must be competent at the level of the Qualification and registered with the relevant accredited ETQA to ensure that the standard is consistent. Moderators must also be registered assessors with the relevant ETQA. A relevant accredited ETQA will monitor and quality assure moderation and assessment according to the guidelines in the Qualification.

CRITERIA FOR THE REGISTRATION OF ASSESSORS
For an applicant to register as an assessor, the applicant should:

> Be registered as an assessor with the relevant ETQA or an ETQA that has a memorandum of understanding with the relevant ETQA.
> Be in possession of a relevant Qualification at NQF Level 7 or higher.

NOTES
People who attempt this Qualification need to be aware that Special Operations and Special Rules Areas include but are not limited to Extended Twin Operations/Long Range Operations (ETOPS/LROPS), Decompression, Reduced Vertical Separation Minima (RVSM), Minimal Navigational Performance Specifications (MNPS), Decision Point Procedure (DPP), Re-dispatch Decision Point (RDP), non-normal aircraft configurations, Random Navigation (RNAV), Least Time Track and Mach Number Technique.

UNIT STANDARDS

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Fundamental	243278	Analyse and apply safety principles in aviation	Level 6	5

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Fundamental	117439	Disseminate information	Level 6	15
Fundamental	244193	Evaluate, analyse, interpret and communicate information in a complex designated area of responsibility	Level 6	15
Core	246519	Assure own publishing project output quality	Level 5	5
Core	120042	Interpret meteorology for aviation	Level 5	7
Core	120158	Analyse the effects of aeroplane loading	Level 6	4
Core	263026	Calculate aircraft speeds and brake and wheel limitations	Level 6	4
Core	263084	Determine field and climb performance	Level 6	40
Core	262825	Determine landing performance	Level 6	30
Core	263016	Determine non-normal take-off performance	Level 6	45
Core	262986	Examine airport and flight path characteristics	Level 6	30
Core	262987	Monitor and analyse aircraft performance	Level 6	40
Core	263004	Perform operational planning	Level 6	45
Core	263008	Produce flight planning information	Level 6	25
Core	263009	Produce weight and balance information	Level 6	40
Elective	120303	Apply principles of risk management	Level 5	8
Elective	115855	Create, maintain and update record keeping systems	Level 5	5
Elective	120045	Demonstrate understanding of aircraft instrumentation	Level 5	6
Elective	243816	Develop a project quality management plan for a simple to moderately complex project	Level 5	6
Elective	117871	Facilitate learning using a variety of given methodologies	Level 5	10
Elective	114883	Measure value-added, multi factor and total factor productivity within an organisation	Level 5	10
Elective	243330	Perform planning for an Instrument Flight Rules flight	Level 5	2
Elective	114069	Administer security systems for a multi-user computer system	Level 6	15
Elective	244196	Analyse and critically evaluate safety management systems	Level 6	6
Elective	243287	Perform pre-flight planning for large aeroplanes	Level 6	11

LEARNING PROGRAMMES RECORDED AGAINST THIS QUALIFICATION
None

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Determine landing performance

SAQA US ID	***UNIT STANDARD TITLE***		
262825	Determine landing performance		
ORIGINATOR		***PROVIDER***	
SGB Aerospace Operations			
FIELD		***SUBFIELD***	
10 - Physical, Mathematical, Computer and Life Sciences		Physical Sciences	
ABET BAND	***UNIT STANDARD TYPE***	***NQF LEVEL***	***CREDITS***
Undefined	Regular	Level 6	30

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

SPECIFIC OUTCOME 1
Establish landing field performance.

SPECIFIC OUTCOME 2
Provide for non-standard aircraft landing configurations.

SPECIFIC OUTCOME 3
Produce go-around thrust setting tables.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	66109	National Certificate: Aircraft Performance Engineering	Level 6

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Examine airport and flight path characteristics

SAQA US ID	*UNIT STANDARD TITLE*		
262986	Examine airport and flight path characteristics		
ORIGINATOR		*PROVIDER*	
SGB Aerospace Operations			
FIELD		*SUBFIELD*	
10 - Physical, Mathematical, Computer and Life Sciences		Physical Sciences	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	30

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

SPECIFIC OUTCOME 1
Analyse aerodrome characteristics.

SPECIFIC OUTCOME 2
Analyse obstacle clearance.

SPECIFIC OUTCOME 3
Analyse engine out flight path.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	66109	National Certificate: Aircraft Performance Engineering	Level 6

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Monitor and analyse aircraft performance

SAQA US ID	*UNIT STANDARD TITLE*		
262987	Monitor and analyse aircraft performance		
ORIGINATOR		*PROVIDER*	
SGB Aerospace Operations			
FIELD		*SUBFIELD*	
10 - Physical, Mathematical, Computer and Life Sciences		Physical Sciences	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	40

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

SPECIFIC OUTCOME 1
Audit aircraft performance.

SPECIFIC OUTCOME 2
Monitor experienced block times.

SPECIFIC OUTCOME 3
Determine aircraft cruise speeds.

SPECIFIC OUTCOME 4
Administer fuel burn retention guarantees.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	66109	National Certificate: Aircraft Performance Engineering	Level 6

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Perform operational planning

SAQA US ID	*UNIT STANDARD TITLE*		
263004	Perform operational planning		
ORIGINATOR		*PROVIDER*	
SGB Aerospace Operations			
FIELD		*SUBFIELD*	
10 - Physical, Mathematical, Computer and Life Sciences		Physical Sciences	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	45

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

SPECIFIC OUTCOME 1
Develop a route.

SPECIFIC OUTCOME 2
Determine payload ability.

SPECIFIC OUTCOME 3
Determine fuel requirements for route optimisation.

SPECIFIC OUTCOME 4
Minimise cost of operation.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	66109	National Certificate: Aircraft Performance Engineering	Level 6

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Produce flight planning information

SAQA US ID	*UNIT STANDARD TITLE*		
263008	Produce flight planning information		
ORIGINATOR		*PROVIDER*	
SGB Aerospace Operations			
FIELD		*SUBFIELD*	
10 - Physical, Mathematical, Computer and Life Sciences		Physical Sciences	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	25

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

SPECIFIC OUTCOME 1
Create fuel burn tables.

SPECIFIC OUTCOME 2
Create flight planning tables.

SPECIFIC OUTCOME 3
Adjust fuel burn tables for use in flight planning.

SPECIFIC OUTCOME 4
Provide weight and balance data for automated dispatch control systems (AHM560).

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	66109	National Certificate: Aircraft Performance Engineering	Level 6

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Produce weight and balance information

SAQA US ID	*UNIT STANDARD TITLE*		
263009	Produce weight and balance information		
ORIGINATOR		*PROVIDER*	
SGB Aerospace Operations			
FIELD		*SUBFIELD*	
10 - Physical, Mathematical, Computer and Life Sciences		Physical Sciences	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	40

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

SPECIFIC OUTCOME 1
Determine Basic Weight and Centre of Gravity (CG).

SPECIFIC OUTCOME 2
Determine dry operating weight (DOW).

SPECIFIC OUTCOME 3
Determine average passenger weight.

SPECIFIC OUTCOME 4
Produce balance chart/trim sheet.

SPECIFIC OUTCOME 5
Produce electronic weight and balance data (AHM560).

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	66109	National Certificate: Aircraft Performance Engineering	Level 6

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Determine non-normal take-off performance

SAQA US ID	*UNIT STANDARD TITLE*		
263016	Determine non-normal take-off performance		
ORIGINATOR		*PROVIDER*	
SGB Aerospace Operations			
FIELD		*SUBFIELD*	
10 - Physical, Mathematical, Computer and Life Sciences		Physical Sciences	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	45

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

SPECIFIC OUTCOME 1
Adjust take off performance according to runway conditions.

SPECIFIC OUTCOME 2
Calculate aircraft field length performance for non-standard aircraft braking configuration.

SPECIFIC OUTCOME 3
Calculate aircraft performance for non-standard aircraft configuration deviations.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	66109	National Certificate: Aircraft Performance Engineering	Level 6

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Calculate aircraft speeds and brake and wheel limitations

SAQA US ID	***UNIT STANDARD TITLE***		
263026	Calculate aircraft speeds and brake and wheel limitations		
ORIGINATOR		***PROVIDER***	
SGB Aerospace Operations			
FIELD		***SUBFIELD***	
10 - Physical, Mathematical, Computer and Life Sciences		Physical Sciences	
ABET BAND	***UNIT STANDARD TYPE***	***NQF LEVEL***	***CREDITS***
Undefined	Regular	Level 6	4

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

SPECIFIC OUTCOME 1
Determine aircraft take off speeds.

SPECIFIC OUTCOME 2
Establish landing reference speeds.

SPECIFIC OUTCOME 3
Calculate brake and wheel cooling periods.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	66109	National Certificate: Aircraft Performance Engineering	Level 6

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Determine field and climb performance

SAQA US ID	*UNIT STANDARD TITLE*		
263084	Determine field and climb performance		
ORIGINATOR		*PROVIDER*	
SGB Aerospace Operations			
FIELD		*SUBFIELD*	
10 - Physical, Mathematical, Computer and Life Sciences		Physical Sciences	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	40

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

SPECIFIC OUTCOME 1
Establish field length performance limits.

SPECIFIC OUTCOME 2
Optimise take off climb performance.

SPECIFIC OUTCOME 3
Calculate and produce thrust setting tables.

SPECIFIC OUTCOME 4
Ascertain missed approach climb performance.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	66109	National Certificate: Aircraft Performance Engineering	Level 6