
GOVERNMENT NOTICES

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

No. 1169

9 December 2005

**SOUTH AFRICAN QUALIFICATIONS AUTHORITY (SAQA)**

In accordance with regulation 24(c) of the Regulations of 28 March 1998, the Standards Generating Body (SGB) for

Mining and Minerals

Registered by Organising Field 06, Manufacturing, Engineering and Technology, publishes the following qualification and unit standards for public comment.

This notice contains the titles, fields, sub-fields, **NQF** levels, credits, and purpose of the qualification and unit standard. The qualification and unit standard can be accessed via the SAQA web-site at www.sqa.org.za. Copies may also be obtained from the Directorate of Standards Setting and Development at the **SAQA** offices, Hatfield Forum West, **1067** Arcadia Street, Hatfield, Pretoria.

Comment on the unit standards should reach SAQA at the address ***below and no later than 13 January 2006***. All correspondence should be marked **Standards Setting – SGB for Mining and Minerals** and addressed to

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ACTING DIRECTOR: STANDARDS SETTING AND DEVELOPMENT



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:

| SAQA QUAL ID | | QUALIFICATION TITLE | |
|------------------------------|-----------------|----------------------------------------------------------------|----------------------------|
| 50082 | | Further Education and Training Certificate: Minerals Surveying | |
| SGB NAME | | ORGANISING FIELD ID | PROVIDER NAME |
| SGB Mining and Minerals | | 6 | |
| QUAL TYPE | | ORGANISING FIELD DESCRIPTION | SUBFIELD |
| Further Ed and Training Cert | | Manufacturing, Engineering and Technology | Fabrication and Extraction |
| ABET BAND | MINIMUM CREDITS | NQF LEVEL | QUALIFICATION CLASS |
| Undefined | 148 | Level 4 | Regular-Unit Stds Based |
| | | | |

PURPOSE AND RATIONALE OF THE QUALIFICATION

Purpose:

The purpose of this qualification is to build knowledge and skill that is required by employees in a minerals surveying environment that would add value to the qualifying learner in terms of enrichment of the person, status and recognition. It provides an opportunity for learners to learn and apply skills in relation to the workplace.

People credited with this qualification are able to:

- > Understand and solve problems and understand business principles and their application by being able to communicate in a variety of ways and apply the following principles in practical applications.
- > **Utilise** mathematical and computer science skills.
- > Perform Tape Surveys, Plot and Calculate Quantities from Related Observations.
- > Construct and Extract Information from Mine Plans.
- > Establish the Spatial Position of Survey Points by means of accepted Survey Methods.
- > Perform Calculations from Survey Observations and Apply Results.

The qualification is designed to be flexible and accessible so that people are able to demonstrate the competencies in minerals surveying across the mining and minerals sector.

The unit standards are intended as building blocks for the further development of skills that will make the learner a more fulfilled, informed, efficient and cost effective worker in the industry. This should result in more efficient service to the customer and make the industry more competitive in the global market.

Rationale:

The Mining & Minerals sector serves the need of the society and the economy. The FETC in Minerals Surveying is designed to benefit both the learner and the employer in the sector and thus contribute to an improved economy by ensuring learner competence and enhanced productivity.

Through its design this qualification will meet the needs of learners in the Mining and Minerals sector (or those wishing to enter the Mining and minerals sector) who require technical expertise and essential knowledge and the qualification will give them the opportunity to balance their practical skills with the essential knowledge needed to earn a formal qualification in minerals surveying. The qualification facilitates access from previously disadvantaged groups and other learners to acquire the technical knowledge and skills that are required.

Persons working in minerals surveying require a sound knowledge of the mining and minerals environment and the capacity to understand minerals surveying operations. The person acquiring this qualification will be able to competently perform traversing, levelling and tape surveying in the mining environment as well as the associated calculations and reports. The person will also be responsible for the health, safety and experiential training of persons under their supervision and will be able to interact with all other mining disciplines.

The **FETC**: Minerals Surveying will produce proficient learners who are able to contribute to improved productivity and efficiency within the industry. The impact and benefit of the qualification on the learner and the mining industry can be detailed as follows:

> The learner will be able to perform a wider range of tasks in the minerals surveying discipline as well as gain recognition for his/her ability and achievements. The learner will also be able to use the qualification as a means to attain further qualifications. The industry will benefit by having personnel who are proficient in the field of minerals surveying resulting in improved production and a safer working environment.

This qualification will enhance the status, productivity and employability of the learner within the mining and minerals industry as well as contribute to the quality, production rate and growth. This allows for access, progression, portability and mobility within and between the different mining operations areas in the mining and minerals industry.

This qualification will also provide the means for current workers to receive recognition of prior learning, to upgrade their skills and achieve a nationally recognised qualification. The qualification is structured in such a way that it exposes the learner to different aspects of minerals surveying. It is anticipated that this qualification will promote the notion of life long learning. This will lead to competence in the field of work and thereby add value to the industry and improve the economy of the country. It will also lead to a balanced society in that learners will understand how the work they do fits into the greater mining industry.

RECOGNIZE PREVIOUS LEARNING?

Y

LEARNING ASSUMED TO BE IN PLACE

It is assumed that learners are already competent in:

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

Recognition of Prior Learning:

This qualification can be achieved wholly or in part through recognition of prior learning in terms of the criteria laid out.

Evidence can be presented in a variety of forms, including international or previous local qualifications, reports, testimonials mentioning functions performed, work records, portfolios, videos of practice and performance records.

All such evidence should be judged according to the general principles of assessment described in the note to assessors.

Access to the Qualification:

> There is open access to the qualification.

QUALIFICATION RULES

Level, credits and learning components assigned to the Qualification:

This qualification is made up of a planned combination of learning outcomes that have a defined purpose and will provide the qualifying learners with applied competence and a basis for further learning. The qualification is made up of standards that are classified as Fundamental, Core and Electives for the purpose of this qualification.

Rules of combination:

The qualification provides a learning pathway in a variety of specializations.

Each of the learning pathways will include the compulsory fundamentals of **56** credits as well as compulsory core of **74** credits with a minimum of **18** credits chosen from the electives as follows:

A total of **148** credits are required to obtain the qualification.

Combination of **33** credits related to rock breaking:

- > Identify and evaluate the effect of seismic activity on the rock mass and support units.
 - > Level **3, 4** credits, ID: **115758**
- > Identify and evaluate signs of deteriorating ground conditions during the mining process.
 - > Level **4, 4** credits, ID: **115756**
- > Conduct a risk assessment using geotechnical data, and local geotechnical plan.
 - > Level **4, 2** credits, ID: **120399**
- > Explain rock strength deterioration.
 - > Level **4, 4** credits, ID: **120415**
- > Demonstrate an understanding of the role of pillars as a support medium, design considerations and principles.
 - > Level **4, 4** credits, ID: **115746**
- > Explain rock behaviour under various loading conditions.
 - > Level **4, 4** credits, ID: **120414**
- > Demonstrate an understanding of the relationship between geological structures and mining layouts.
 - > Level **4, 3** credits, ID: **115678**
- > Demonstrate an understanding of the characteristics of different depth environments.
 - > Level **4, 4** credits, ID: **120409**
- > Demonstrate an understanding of mining strategies applicable to the various depth environments.
 - > Level **4, 6** credits, ID: **120406**

A combination of **26** credits related to Sampling / Valuation:

- > Mark *off* & map face sampling sections for mineral evaluation purposes.
 - > Level **4, 11** credits, ID: **9754**
- > Conduct a grade control investigation.
 - > Level **4, 15** credits, ID: **11113**

A combination of **18** credits related to Mining / Geology:

- > Demonstrate an Understanding of Sedimentary Rocks.
 - > Level **4, 6** credits, ID: **115701**
- > Demonstrate an Understanding of Igneous Rocks.
 - > Level **4, 6** credits, ID: **115705**
- > Demonstrate an Understanding of Metamorphic Rocks.
 - > Level **4, 6** credits, ID: **115708**

EXIT LEVEL OUTCOMES

1. Communicate and solve problems in a variety of ways and apply business principles.
2. Perform tape surveys, plot and calculate quantities from related observations.
3. Construct and extract information from mine plans.
4. Establish the spatial position of survey points by means of accepted survey methods.
5. Perform calculations from survey observations and apply results.

Critical Cross Field Outcomes supported by Exit Level Outcomes:

> Identifying and solving problems in which responses display that responsible decisions using critical thinking have been made.

Equivalent exit level outcomes:

1. Communicate and solve problems in a variety of ways and apply business principles.
3. Construct and extract information from mine plans.

> Working effectively with others as a member of a team, group, organization and community.

Equivalent exit level outcomes:

1. Communicate and solve problems in a variety of ways and apply business principles.
4. Establish the spatial position of survey points by means of accepted survey methods.
5. Perform calculations from survey observations and apply results.

> Organising and managing oneself and one's activities responsibly and effectively.

Equivalent exit level outcomes:

2. Perform tape surveys, plot and calculate quantities from related observations.
4. Establish the spatial position of survey points by means of accepted survey methods.
5. Perform calculations from survey observations and apply results.

> Collecting, analyzing, organizing and critically evaluating information.

Equivalent exit level outcomes:

2. Perform tape surveys, plot and calculate quantities from related observations.
3. Construct and extract information from mine plans.
4. Establish the spatial position of survey points by means of accepted survey methods.
5. Perform calculations from survey observations and apply results.

> Communicating effectively using visual, mathematical and/or language skills.

Equivalent exit level outcomes:

1. Communicate and solve problems in a variety of ways and apply business principles.
4. Establish the spatial position of survey points by means of accepted survey methods.
5. Perform calculations from survey observations and apply results.

> Using science and technology effectively and critically, showing responsibility toward the environment and health of others.

Equivalent exit level outcomes:

2. Perform tape surveys, plot and calculate quantities from related observations.
3. Construct and extract information from mine plans.
4. Establish the spatial position of survey points by means of accepted survey methods.

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

Equivalent exit level outcomes:

1. Communicate and solve problems in a variety of ways and apply business principles.
3. Construct and extract information from mine plans.
4. Establish the spatial position of survey points by means of accepted survey methods.
5. Perform calculations from survey observations and apply results.

ASSOCIATED ASSESSMENT CRITERIA

1.

- > Oral and written communication is successfully engaged in within the minerals surveying environment.
 > Related problems are understood and solved to indicate critical and creative thinking.

> Business principles are understood and applied within a business environment.

2.

- > Surveying related to minerals surveying is conducted correctly.
- > Tape and offset surveying are undertaken as required.
- > Linear measurements on a plan are plotted and quantities are calculated correctly.

3.

- > Information is obtained from a plan.
- > A Cartesian coordinate grid is constructed and points are plotted.
- > Survey points are plotted and projected.

4.

- > A survey instrument is set up to take observations.
 - > The position of a survey point is observed.
- Range: polar/traversing/forward intersection/tacheometric methods.
- > The elevation of a point is determined by levelling.
 - > Survey control is established and drilling machines are aligned.

5.

- > Grade chains are calculated and manufactured.
- > The provisional position of a survey point is calculated from polar/traverse observations.
- > Tacheometric observations are reduced and a plan is produced.

Integrated Assessment:

Integrated assessment at the level of the qualification provides an opportunity for learners to show they are able to integrate concepts, actions and ideas achieved across a range of unit standards and contexts.

Integrated assessment must evaluate the quality of observable performance as well as the thinking behind the performance, and must be based on a summative assessment guide. The guide will spell out how the assessor will assess different aspects of the performance and will include:

- > Observing the learner at work (both in the primary activity as well as other interactions).
- > Asking questions and initiating short discussions to test understanding.
- > Looking at records and reports in the portfolio and reviewing previous assessments.

In some cases inference will be necessary to determine competence depending on the nature and context within which performance takes place.

It is necessary to ensure that the fundamental part of the qualification is also targeted to ensure that while the competence may have been achieved in a particular context, learners are able to apply it in a range of other contexts and for further learning. The assessment should also ensure that all the critical cross-field outcomes have been achieved.

The learner may choose in which language/s/he wants to be assessed. This should be established as part of a process of preparing the learner for assessment and familiarising the learner with the approach being taken.

While this is primarily a workplace-based qualification, evidence from other areas of endeavour may be introduced if pertinent to any of the exit-level outcomes. The assessment process should cover both the explicit tasks required for the qualification as well as the understanding of the concepts and principles that underpin the activities associated with the tube and pipe manufacturing process.

INTERNATIONAL COMPARABILITY

In terms of these unit standards and qualifications an intensive search was conducted via the internet utilising key words such as unit standard, mining, surface mining, mining environments. National qualification sites on the internet were also explored to determine whether unit standards or qualifications in the Minerals Surveying field existed and if so whether the content would be useful for the development of the unit standards and qualification. The following sites were looked at:

- > <http://www.rajasthan.gov.in/MINERAL.SHTM> - the courses/programmes found here were at an advanced level, which is not the objective of this South African qualification.

> <http://www.ntis.gov.au/cgi>The "National Diploma in Surveying (Level 6) with an optional strand in Mine Surveying" was found. Certain components of this qualification can be found in this proposed South African FETC for example: the requirements for "Plan surveying processes" and "Gather Data" from the New Zealand qualification may be similar to "Perform tape surveys". From this South African certificate.

> Softree engineering - Engineering an easier way <http://www.softree.com> (CANADA).

The following three-day course was analysed:

> Surveying and Mapping (3 days).

> This course targets both novice and experienced users. The course covers entry of survey notes, closing and adjusting traverses, geo-referencing, terrain modelling, contouring, profiles, volumes, drafting functions, and output sheet generation.

> The elements within this course would be deemed appropriate for training learners towards the FETC.

> <http://www.leica-geosystems.com> (Training conducted in the USA and Canada).

> Various short programmes are trained. These programmes (combined) could also be deemed appropriate for learning towards this FETC.

In general this qualification and its component unit standards compare well with their international counterparts. The only major differences are in formatting and scope of coverage or focus. South Africa has a world class and highly sophisticated Mining and Minerals Sector. In selecting countries for international comparability it is important to consider countries where mining occurs or in countries where processes that can be used within mines exist. Within this qualification countries that have world-class mineral surveying practices were benchmarked.

ARTICULATION OPTIONS

The qualification allows for horizontal and vertical articulation.

Vertical Articulation:

> National Diploma in Minerals Surveying at NQF Level 5.

Horizontal articulation:

> FETC: Surveying

> FETC: Geomatics

> FETC: Hydrographic Surveying

> FETC: Photogrammetry Surveying

MODERATION OPTIONS

> Anyone assessing a learner or moderating the assessment of a learner against this unit standard 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 unit standard 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 Unit Standard.

> Anyone wishing to be assessed against this unit standard 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

Assessors should be in possession of:

- > An appropriate qualification at NQF Level 5 or above and preferably relevant workplace practical experience.
- > Registration as an assessor with the relevant ETQA.

NOTES

NIA

UNIT STANDARDS

(Note: A blank space after this line means that the qualification is not based on Unit Standards.)

| | UNIT STANDARD ID AND TITLE | LEVEL | CREDITS | STATUS |
|-------------|---------------------------------------------------------------------------------------------------------|--------------|----------------|----------------------------|
| core | 11111 Calculate and manufacture grade chains | Level 3 | 3 | Registered |
| core | 11596 Construct a Cartesian co-ordinate grid and plot points | Level 3 | 4 | Reregistered |
| core | 11637 Set up a survey instrument to take observations | Level 3 | 4 | Reregistered |
| core | 11694 Undertake tape and offset surveying | Level 3 | 5 | Reregistered |
| core | 9762 Plot and project survey points | Level 4 | 8 | Reregistered |
| core | 9763 Establish side-grade pegs in a flat development end | Level 4 | 7 | Reregistered |
| core | 11117 Plot linear measurements on a plan and calculate quantities | Level 4 | 4 | Registered |
| core | 11122 Perform tape surveys | Level 4 | 7 | Reregistered |
| core | 11124 Establish survey control and align drilling machines | Level 4 | 4 | Registered |
| core | 11598 Determine the elevation of a point by levelling | Level 4 | 5 | Reregistered |
| core | 11624 Obtain information from a plan | Level 4 | 4 | Reregistered |
| core | 14235 Observe the position of a survey point by using tacheometric methods | Level 4 | 4 | Reregistered |
| core | 14236 Observe the position of a survey point by polar / traversing | Level 4 | 4 | Reregistered |
| core | 14237 Observe the position of a survey point by forward intersection | Level 4 | 4 | Reregistered |
| core | 14258 Reduce tacheometric observations and produce a plan | Level 4 | 2 | Reregistered |
| core | 14434 Calculate the provisional position of a survey point from polar/traverse observations | Level 4 | 5 | Reregistered |
| Elective | 115678 Demonstrate basic knowledge and understanding of geology related to mining | Level 2 | 1 | Registered |
| Elective | 11113 Conduct a grade control investigation | Level 3 | 15 | Registered |
| Elective | 115746 Demonstrate an elementary understanding of pillar characteristics, behaviour and function | Level 3 | 3 | Registered |
| Elective | 115758 Identify and evaluate the effect of seismic activity on the rock mass and support units | Level 3 | 4 | Registered |
| Elective | 9244 Plan and conduct meetings | Level 4 | 4 | Reregistered |
| Elective | 9754 Mark off and map face sampling sections for mineral evaluation purposes | Level 4 | 11 | Reregistered |
| Elective | 13949 Apply technical knowledge and skill to align business unit performance to business goals | Level 4 | 5 | Registered |
| Elective | 115701 Demonstrate an understanding of sedimentary rocks | Level 4 | 6 | Registered |
| Elective | 115705 Demonstrate an understanding of igneous rocks | Level 4 | 6 | Registered |
| Elective | 115708 Demonstrate an understanding of metamorphic rocks | Level 4 | 6 | Registered |
| Elective | 115756 Identify and evaluate signs of deteriorating ground conditions during the mining process | Level 4 | 4 | Registered |
| Elective | 120399 Conduct a risk assessment using geotechnical data and a local geotechnical plan | Level 4 | 2 | Draft - Prep for P Comment |
| Elective | 120406 Demonstrate an understanding of mining strategies applicable to the different depth environments | Level 4 | 6 | Draft - Prep for P Comment |
| Elective | 120409 Demonstrate an understanding of the characteristics of different depth environments | Level 4 | 4 | Draft - Prep for P Comment |
| Elective | 120414 Explain rock behaviour under various loading conditions | Level 4 | 4 | Draft - Prep for P Comment |
| Elective | 120415 Explain rock strength deterioration | Level 4 | 4 | Draft - Prep for P Comment |
| Elective | 14214 Evaluate and improve the project team's performance | Level 5 | 8 | Reregistered |
| Fundamental | 8968 Accommodate audience and context needs in oral communication | Level 3 | 5 | Reregistered |
| Fundamental | 8969 Interpret and use information from texts | Level 3 | 5 | Reregistered |

| | | | | |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------|--------|---|--------------|
| Fundamental | 8971 Analyse and respond to a variety of literary texts | Level3 | 5 | Reregistered |
| Fundamental | 8973 Use language and communication in occupational learning programmes | Level3 | 5 | Reregistered |
| Fundamental | 7468 Use mathematics to investigate and monitor the financial aspects of personal, business, national and international issues | Level4 | 6 | Reregistered |
| Fundamental | 8974 Engage in sustained oral communication and evaluate spoken texts | Level4 | 5 | Reregistered |
| Fundamental | 8975 Read, analyse and respond to a variety of texts | Level4 | 5 | Reregistered |
| Fundamental | 8976 Write for a wide range of contexts | Level4 | 5 | Reregistered |
| Fundamental | 8979 Use language and communication in occupational learning programmes | Level4 | 5 | Reregistered |
| Fundamental | 9015 Apply knowledge of statistics and probability to critically interrogate and effectively communicate findings on life related problems | Level4 | 6 | Reregistered |
| Fundamental | 9016 Represent, analyse and calculate shape and motion in 2- and 3-dimensional space in different contexts | Level4 | 4 | Reregistered |



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

1

Conduct a risk assessment using geotechnical data and a local geotechnical plan

| SAQA US ID | UNIT STANDARD TITLE | | |
|-------------------------|---------------------------------------------------------------------------------|----------------------------|--------------------|
| 120399 | Conduct a risk assessment using geotechnical data and a local geotechnical plan | | |
| SGB NAME | ORGANISING FIELD ID | PROVIDER NAME | |
| SGB Mining and Minerals | 6 | | |
| UNIT STANDARD TYPE | ORGANISING FIELD DESCRIPTION | SUBFIELD DESCRIPTION | |
| Regular | Manufacturing, Engineering and Technology | Fabrication and Extraction | |
| ABET BAND | CREDITS | NQF LEVEL | UNIT STANDARD TYPE |
| Undefined | 2 | Level 4 | Regular |

SPECIFIC OUTCOME 1

Apply the criteria used to assess rock engineering risk from geotechnical plans.

SPECIFIC OUTCOME 2

Prepare to conduct a risk assessment.

SPECIFIC OUTCOME 3

Conduct a risk assessment.

SPECIFIC OUTCOME 4

Communicate results of the risk assessment.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

2

| SAQA US ID | UNIT STANDARD TITLE | | |
|---------------------------|--------------------------------------------------------------------------------------------------|-----------------------------|---------------------------|
| 120406 | Demonstrate an understanding of mining strategies applicable to the different depth environments | | |
| SGB NAME | ORGANISING FIELD ID | PROVIDER NAME | |
| SGB Mining and Minerals | 6 | | |
| UNIT STANDARD TYPE | ORGANISING FIELD DESCRIPTION | SUBFIELD DESCRIPTION | |
| Regular | Manufacturing, Engineering and Technology | Fabrication and Extraction | |
| ABET BAND | CREDITS | NQF LEVEL | UNIT STANDARD TYPE |
| | | | |

SPECIFIC OUTCOME 1

Demonstrate knowledge of different mining strategies and the typical depth environments they are employed.

SPECIFIC OUTCOME 2

Assess the potential risk in the mining environment to be addressed by the mining strategy.

SPECIFIC OUTCOME 3

Interpret the mining strategies employed in deep and ultra-deep mining environments.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

3

| SAQA US ID | UNIT STANDARD TITLE | | |
|-------------------------|-------------------------------------------------------------------------------------|----------------------------|--------------------|
| 120409 | Demonstrate an understanding of the characteristics of different depth environments | | |
| SGB NAME | ORGANISING FIELD ID | PROVIDER NAME | |
| SGB Mining and Minerals | 6 | | |
| UNIT STANDARD TYPE | ORGANISING FIELD DESCRIPTION | SUBFIELD DESCRIPTION | |
| Regular | Manufacturing, Engineering and Technology | Fabrication and Extraction | |
| ABET BAND | CREDITS | NQF LEVEL | UNIT STANDARD TYPE |
| Undefined | 4 | Level 4 | Regular |

SPECIFIC OUTCOME 1

Explain **how** the different depth environments are classified.

SPECIFIC OUTCOME 2

Explain the importance and effect of depth on horizontal and vertical stress to underground excavations.

SPECIFIC OUTCOME 3

Describe the factors controlling the stability of underground excavations in different depth environments.

SPECIFIC OUTCOME 4

Explain the potential rockfall and rockburst hazard in different depth environments.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

' 4

| SAQA US ID | UNIT STANDARD TITLE | | |
|-------------------------|---------------------------------------------------------|----------------------------|--------------------|
| 120414 | Explain rock behaviour under various loading conditions | | |
| SGB NAME | ORGANISING FIELD ID | PROVIDER NAME | |
| SGB Mining and Minerals | 6 | | |
| UNIT STANDARD TYPE | ORGANISING FIELD DESCRIPTION | SUBFIELD DESCRIPTION | |
| Regular | Manufacturing, Engineering and Technology | Fabrication and Extraction | |
| ABET BAND | CREDITS | NQF LEVEL | UNIT STANDARD TYPE |
| Undefined | 4 | Level 4 | Regular |

SPECIFIC OUTCOME 1

Explain the components of a typical load deformation **curve** for rock.

SPECIFIC OUTCOME 2

Describe rock behaviour under uniaxial loading.

SPECIFIC OUTCOME 3

Describe the effects of rock behaviour under triaxial loading.

SPECIFIC OUTCOME 4

Explain rheological (time dependent) behaviour of rock under various loading conditions.



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

5

| SAQA US ID | UNIT STANDARD TITLE | | |
|-------------------------|-------------------------------------------|----------------------------|--------------------|
| 120415 | Explain rock strength deterioration | | |
| SGB NAME | ORGANISING FIELD ID | PROVIDER NAME | |
| SGB Mining and Minerals | 6 | | |
| UNIT STANDARD TYPE | ORGANISING FIELD DESCRIPTION | SUBFIELD DESCRIPTION | |
| Regular | Manufacturing, Engineering and Technology | Fabrication and Extraction | |
| ABET BAND | CREDITS | NQF LEVEL | UNIT STANDARD TYPE |
| Undefined | 4 | Level 4 | Regular |

SPECIFIC OUTCOME 1

Explain the influence of mineralogical composition on rock strength deterioration.

SPECIFIC OUTCOME 2

Explain rock strength deterioration due to the presence of natural and induced discontinuities.

SPECIFIC OUTCOME 3

Explain rock strength deterioration due to loading.

SPECIFIC OUTCOME 4

Explain the techniques used to estimate deterioration in field strength of rock.