

**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

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 Standards. The full Qualification and Unit Standards can be accessed via the SAQA web-site at www.saqqa.org.za. Copies may also be obtained from the Directorate of Standards Setting and Development at the SAQA offices, SAQA House, 1067 Arcadia Street, Hatfield, Pretoria.

Comment on the Qualification and Unit Standards should reach SAQA at the address below and **no later than 29 February 2008**. All correspondence should be marked **Standards Setting – Mining and Minerals** and addressed to

The Director: Standards Setting and Development
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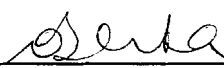
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SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:**National Certificate: Rock Engineering: Strata Control**

SAQA QUAL ID	QUALIFICATION TITLE		
60369	National Certificate: Rock Engineering: Strata Control		
ORIGINATOR	PROVIDER		
SGB Mining and Minerals			
QUALIFICATION TYPE	FIELD	SUBFIELD	
National Certificate	6 - Manufacturing, Engineering and Technology	Fabrication and Extraction	
ABET BAND	MINIMUM CREDITS	NQF LEVEL	QUAL CLASS
Undefined	136	Level 3	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 equip learners with the theoretical knowledge, technical skills and practical ability to function as a Junior Strata Control Officer within the mining environment. Junior Strata Control Officers assist personnel engaged in mining operations to ensure:

- The safety and efficiency of mining operations.
- The development of mining personnel skill levels.
- Pro-active reduction in levels of rock related risk in mining operations.

Seen on a national level, safe and productive mines operate at optimal level; with maximum orebody extraction, the lowest possible safety risk and best operating cost. This has spin-off benefits in terms of the sustained production of minerals, with increased generation of revenue for the economy, greater investment in South African mines by particularly overseas investors and sustainable employment opportunities within the mining industry for society in general.

This qualification will equip the learner with necessary knowledge, skills and ability for promotion to the post of Junior Strata Control Officer. It is also intended to provide the building blocks upon which to build a further career in rock engineering. Attaining this qualification will improve the learner's skills, thus increasing his potential employability. The concept of the four different streams, with appropriate elective unit standards, means that the learner can move between the different mining operations areas by completing the necessary elective unit standards.

Learners credited with this qualification will be able to:

- Communicate and solve problems in a variety of ways.
- Demonstrate knowledge and application of workplace skills.
- Demonstrate knowledge and understanding of strata control principles.
- Apply strata control and risk assessment principles in mining operations.

- Apply geotechnical and strata control methods, procedures, techniques and equipment to gather geotechnical and strata control-related data.
- Record, interpret and report on observations.

On a practical level, learners equipped with this qualification will be able to conduct the essential operations associated with:

- Identification and reporting of anomalous ground conditions.
- Gathering and recording of geotechnical and strata-control related data.
- Monitoring and testing of support measures.
- Observation and reporting of sub-optimal mining practices.
- Identification of higher risk areas.
- Assist production personnel in identification of rock related hazards; and assessing the risk associated with the different hazards.
- Conduct on-the-job coaching regarding strata control or rock related issues.

Rationale:

Strata Control forms part of the discipline of Rock Engineering, one of the specialist disciplines within the mining environment. Rock engineering may be defined as technical mine engineering that bridges the gap between mining geology and production engineering. Its application turns geological and geotechnical information into rational mine plans, that facilitate maximum orebody extraction at least safety risk and lowest operating cost for the prevailing rockmass conditions. Rock engineering is concerned with the design of mining strategies, excavation layouts and support systems that ensure safe, stable and productive mining operations. There is a need for this qualification as there is a shortage of skilled Rock Engineers as identified in the Sector Skills Plan. This qualification is also necessary as the skills level amongst mining personnel has declined to such an extent that they can no longer conduct Strata Control operations as part of their day-to-day operations.

Strata Control may be defined as a risk management tool, which in part ensures the proper control of the mining environment to minimise the risk of local instability. Effective strata control ensures that on a local scale, appropriate mining strategies and/or support actions are employed to overcome local and unforeseen or unpredictable changes to the prevailing geotechnical environment. This requires on-site training in the mechanics of, and reasons for, excavation failure and the roles and mechanisms of excavation support.

The role of strata control also extends to ensuring adherence to mining layout and support standards, as well as the maintenance of quality control in support type selection and support installation. This is emphasised because the value of even the best available rock engineering advice is diminished if recommended standards and systems are not properly understood or implemented underground.

This NQF Level 3 Qualification builds on the basic foundation of theoretical knowledge, technical skills and practical ability applicable to the discipline of strata control and rock engineering provided by the NQF Level 2 Qualification. The NQF Level 3 Qualification develops the learner's focus from merely "recording" strata control-related issues towards recognizing, investigating and interpreting these issues. It is intended to assist Strata Control Observers to further their career in rock engineering, as well as serve as the appropriate qualification for a learner to be appointed as a Junior Strata Control Officer. This Qualification has 4 specialisation streams for learners to follow, based on different mining environments which vary significantly in geological composition, geotechnical environment and extraction method.

Learners entering this Qualification will typically be Strata Control Observers working in a rock engineering department or consultancy, with a NQF Level 2 National Certificate in Strata Control or similar, although learners with other relevant NQF Level 3 Qualifications wishing to articulate

horizontally will also be considered. While completing the qualification, learners will ideally act or relieve in the position of Strata Control Officer or Junior Strata Control Officer as part of their experiential learning.

Upon obtaining the qualification, the learner will be eligible for appointment as a Junior Strata Control Officer. As such, he/she will be responsible for strata control-related issues for a small shaft or mine, or a section of a larger mine, either alone or with the assistance of one or more Strata Control Observers whom he/she will be expected to supervise.

This is the third qualification in a learning pathway for Rock Engineering. A typical learning pathway for learners with this qualification within the rock engineering discipline begins with the GETC: Mining and Mineral Processes (entrance into discipline), National Certificate: Rock Engineering: Strata Control NQF Level 2, National Certificate: Rock Engineering: Strata Control NQF Level 3 and ends with the FETC: Rock Engineering: Strata Control NQF Level 4. The series provides a developmental pathway for the full range of activities required for Strata Control.

RECOGNIZE PREVIOUS LEARNING?

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LEARNING ASSUMED IN PLACE

- Communication and Mathematical Literacy at NQF Level 2.
- The unit standard "Demonstrate an understanding of the South African mining and mineral sector processes".

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.

Access to the Qualification:

Access is open; however it is preferable that learners have completed the National Certificate in Strata Control at NQF Level 2.

QUALIFICATION RULES

A minimum of 136 Credits is required to complete the qualification. In this qualification, credits are allocated as follows:

Fundamental:

All unit standards totalling 36 Credits are compulsory.

Core:

All unit standards totalling 91 Credits are compulsory.

Electives:

A learner must select an area of specialization from the list and then complete the unit standards in that specialization area totalling a minimum of 9 Credits.

There are four specialization areas possible:

- Specialization Area A: Underground Hard Rock Mining.
- Specialization Area B: Underground Coal Mining.
- Specialization Area C: Massive Mining.
- Specialization Area D: Surface Mining.

For Specialization Area A: Underground Hard Rock Mining (Gold, platinum, chrome, manganese, etc):

Title; Level; Credits:

- Identify and evaluate the effects of seismic activity on the rock mass and support units; Level 3; 4 Credits.
- Demonstrate knowledge and basic understanding of the effect of high mining heights on artificial support installation and effectiveness; Level 3; 2 Credits.
- Demonstrate an understanding of excavation stability in a rock pass; Level 3; 2 Credits.
- Conduct an inspection to evaluate ground conditions in an on-reef development excavation prior to, during and after ledging operations; Level 3; 3 Credits.
- Demonstrate knowledge and elementary understanding of the effect of seismicity on support units and workplace stability; Level 3; 4 Credits.
- Demonstrate elementary knowledge and understanding of precautions required to achieve excavation stability in remnants; Level 3; 3 Credits.
- Demonstrate elementary knowledge and understanding of multi-reef/seam environments to achieve excavation stability with support; Level 3; 2 Credits.
- Demonstrate elementary knowledge and understanding of rockburst prone mining operations to achieve excavation stability with support; Level 3; 2 Credits.
- Demonstrate knowledge and understanding of factors affecting the stability of service excavations; Level 3; 3 Credits.
- Assess gully stability under different geotechnical conditions; Level 3; 3 Credits.

For Specialization Area B: Underground Coal Mining:

Title; Level; Credits:

- Demonstrate knowledge and elementary understanding of the effect of seismicity on support units and workplace stability; Level 3; Credits 4.
- Demonstrate elementary knowledge and understanding of multi-reef/seam environments to achieve excavation stability with support; Level 3; 2 Credits.
- Demonstrate knowledge and understanding of factors affecting the stability of service excavations; Level 3; 3 Credits.
- Demonstrate an understanding of excavation stability in a rock pass; Level 3; 2 Credits.
- Demonstrate elementary knowledge and understanding of rockburst prone mining operations to achieve excavation stability with support; Level 3; 2 Credits.

For Specialization Area C: Massive Mining:

Title; Level; Credits:

- Identify and evaluate the effects of seismic activity on the rock mass and support units; Level 3; 4 Credits.
- Demonstrate knowledge and basic understanding of the effect of high mining heights on artificial support installation and effectiveness; Level 3; 2 Credits.
- Demonstrate an understanding of excavation stability in a rock pass; Level 3; 2 Credits.
- Demonstrate knowledge and elementary understanding of the effect of seismicity on support units and workplace stability; Level 3; 4 Credits.

- Demonstrate elementary knowledge and understanding of multi-reef/seam environments to achieve excavation stability with support; Level 3; 2 Credits.
- Demonstrate elementary knowledge and understanding of rockburst prone mining operations to achieve excavation stability with support; Level 3; 2 Credits.
- Demonstrate knowledge and understanding of factors affecting the stability of service excavations; Level 3; 3 Credits.

For Specialization Area D: Surface Mining:

Title; Level; Credits:

- Identify and evaluate the effects of seismic activity on the rock mass and support units; Level 3; 4 Credits.
- Demonstrate knowledge and basic understanding of the effect of high mining heights on artificial support installation and effectiveness; Level 3; 2 Credits.
- Demonstrate an understanding of slope design to improve stability; Level 3; 3 Credits.
- Demonstrate knowledge of operational techniques to assist in managing the risk of highwall/slope failure; Level 3; 2 Credits.
- Demonstrate knowledge of the effects of blasting operations on highwall/slope stability; Level 3; 3 Credits.

EXIT LEVEL OUTCOMES

1. Communicate and solve problems in a variety of ways.
2. Demonstrate knowledge and application of workplace skills.
3. Demonstrate knowledge and understanding of strata control principles.
 - Range: Strata control principles refer to the basic mathematical, mechanical, geological and mining-related aspects that govern the behaviour of the rock mass encountered in mining operations and affect the stability of excavations in this rock mass.
4. Apply strata control and risk assessment principles in mining operations.
 - Range: Knowledge and understanding of strata control principles is applied to identify strata control-related hazards associated with either the geological environment or the mining process in the workplace. Using the risk assessment process, the risk associated with these hazards is quantified and ranked in association with mining personnel, so that appropriate action plans to restore and maintain excavation stability can be developed.
5. Apply and use geotechnical and strata control methods, procedures, techniques and equipment to gather and record geotechnical and strata control-related data.

Critical Cross-Field Outcomes:

- Identifying and solving problems in which responses display that responsible decisions using critical thinking have been made. Evident in Exit Level Outcomes 1, 2 and 4.
- Working effectively with others as a member of a team, group, organization and community. Evident in Exit Level Outcomes 1, 2, 4 and 5.
- Organising and managing oneself and one's activities responsibly and effectively. Evident in Exit Level Outcomes 1, 2, 4 and 5.
- Collecting, analyzing, organizing and critically evaluating information. Evident in Exit Level Outcomes 2, 3, 4 and 5.
- Communicating effectively using visual, mathematical and/or language skills. Evident in all Exit Level Outcomes.
- Using science and technology effectively and critically, showing responsibility toward the environment and health of others. Evident in all Exit Level Outcomes.

- Demonstrating an understanding of the world as a set of related systems by recognizing that problem contexts do not exist in isolation. Evident in Exit Level Outcomes 2, 3, 4 and 5.

ASSOCIATED ASSESSMENT CRITERIA

Associated Assessment Criteria for Exit Level Outcome 1:

- 1.1 Effective verbal and written communication is conducted related to conducting strata control in mining operations.
- 1.2 Information is gathered regarding knowledge, processes and procedures and applied while performing the tasks related to conducting strata control in mining operations.
- 1.3 Mathematical Literacy, Applied Mechanics and Science principles and knowledge are used in calculations related to the work environment.
- 1.4 Problems and their solutions are recorded and monitored for reoccurrence.

Associated Assessment Criteria for Exit Level Outcome 2:

- 2.1 Occupational Health, Safety and environmental policies and procedures are explained and adhered to in accordance with specified organisational requirements.
- 2.2 Relevant principles and techniques of Human Resources and Industrial Relations are understood and applied while conducting strata control activities.
- 2.3 IT principles and techniques are understood and applied in the context of rock strata control activities.
- 2.4 Work processes and a personal computer are used to input data within an office environment.
- 2.5 On-the-job coaching and promoting the implementation of rock-related mining standards are performed according to organisational guidelines.
- 2.6 Rock-related mining standards are implemented and their use promoted as a strata control function.

Associated Assessment Criteria for Exit Level Outcome 3:

- 3.1 The terminology and concepts relating to strata control in mining operations are explained in accordance with specified requirements.
- 3.2 The characteristics, behaviour and function of different pillars is understood in the context of strata control in mining operations.
- 3.3 The role played by the geological environment in the mining process is understood and explained while conducting strata control related activities.
- 3.4 Causes of falls of ground is understood and explained while performing strata control in mining operations.
- 3.5 The effect of various geological, mine layout/design and mining process-related factors on excavation stability is understood and explained as a strata control function.

Associated Assessment Criteria for Exit Level Outcome 4:

- 4.1 Knowledge and understanding of strata control principles are applied while conducting strata control in mining operations.
- 4.2 Basic calculations related to strata control are done while performing strata control activities.
- 4.3 Various rock-related hazards associated with the geological environment and the mining process are recognised and identified while conducting strata control in mining operations.
- 4.4 A formal risk assessment process is demonstrated in order to quantify and rank the risk associated with identified rock-related hazards.
- 4.5 The results of observations and assessments are recorded in the appropriate format.
 - Range: This format may include:
 - Completed templates.
 - Written reports.
 - Notes on mine plans.

Associated Assessment Criteria for Exit Level Outcome 5:

5.1 Geotechnical and Strata Control methods, procedures and techniques are applied to gather geotechnical and strata control-related data.

5.2 Strata Control monitoring and testing equipment is used while conducting strata control in mining operations.

5.3 Strata Control monitoring and testing equipment is maintained in accordance with manufacturers and organisational requirements.

5.4 Data obtained is recorded, interpreted and reported in the appropriate format on written media or as computerised data.

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 strata control.

INTERNATIONAL COMPARABILITY

The following strategy was followed when research was conducted into international qualifications which could be used to inform the structure of this qualification:

- Countries with a formal Qualifications Framework, such as the United Kingdom (NVQ and SVQ), Australia and New Zealand.
- Countries who are reputed to be leaders in a particular field.
- SADEC countries, which are in geographical proximity to South Africa.
- Countries with emerging economies (particularly in the mining context).

This is based on an informative summary of world mining regions was found on the website www.mbendi.co.za.

North America:

North America is the major producer of gold and silver. Raw mineral production in 1998 was valued at approximately US\$ 70 billion. The industry employs approximately 1 million people. Major companies include Barrick, Newmont and Industrias Penoles.

Europe:

Europe is not a major mining centre. However, it has several established base metal mines in Scandanavia, Ireland and the Iberian Peninsula. Major companies include Boliden and Outokumpu.

Asia:

Asia is a major producer of base metals, PGE's, ferrous metals and coal. Most major producers are state controlled, but foreign investment is being encouraged, in particular by China, India and the CIS.

South America:

South America is a major producer of base and ferrous metals, in particular copper and iron ore. Major companies include Codelco, Barrick, CVRD, Newmont and Rio Tinto.

Africa:

Africa is a major producer of cobalt, gold, PGE's and diamonds. Mining accounts for a substantial proportion of several countries GDP's. Major companies include Anglo American, De Beers and BHP Billiton.

Australasia:

Australasia is a leading producer of iron ore, gold and base metals. Major companies include BHP Billiton and Rio Tinto.

The Southern African mining industry finds itself in a unique situation, in that most mining operations are very labour-intensive, with the workforce generally having a low standard of education. Comparable operations in overseas countries such as the United States, Canada and Australia are highly mechanized, with well-qualified operators. In line with this approach, overseas mines do not have rock engineering departments-strata control issues are handled by the production personnel, while higher-level rock engineering is contracted to specialist consultancies. For this reason, international comparability for Strata Control qualifications from Levels 2 to 4 is extremely difficult. While there may well be study material available for these levels, it is intended for use by production employees and is not of a specialist nature.

Qualifications Frameworks:

Frameworks consulted were those of Australia, New Zealand, United Kingdom (Britain) and Scotland.

While conducting the research in this regard, no evidence could be found of a strata control qualification per se comparable to NQF Level 3.

A number of unit standards (competencies) were found on the New Zealand Framework. Web address: www.nzqa.gov.nz: packaged in the qualification MNC30304: Certificate III in Underground Coal Operations:

- MNCU053A Conduct basic strata control operations.
- MNCU054A Conduct Advanced Strata control operations.

There were also units at Technical Management level (not related to a qualification):

- MNCU131A Establish the mining method and strata control system.
- MNCU132A Implement the strata management plan.
- MNCU133A Apply and monitor the strata management plan.

Leading Countries:

The United States and Canada are considered leaders in the world in terms of mining methodology, equipment and training:

- Edumine (www.edumine.com) offers professional development courses. Rock Engineering for non-engineers in mining addresses rock engineering (strata control) issues for personnel of mining companies who are not directly involved in mining.
- The (USA) National Institute for Occupational Health and Safety (NIOSH) (<http://www.cdc.gov/niosh/>) offer a programme in ground control covering:
 - Using Mines Safety and Health Administration (MSHA) statistics and extensive interactions with the mining community to identify the most critical hazards.
 - Employing state-of-the-art strata control science in a targeted program of research that develops practical solutions.
 - Aggressively transferring research results to end users in the mining community.
 - Serving as the mining community's resource for the best strata control information available, and providing training and technical assistance consistent with this mission.

In the SADC region officers within the rock engineering supportive services area in mines are taught the skills at the workplace. No generic courses/programmes could be found to perform a comparative analysis.

Conclusions:

International comparability in this instance has not revealed comparable qualifications for one or more of the following reasons:

- The required level of competence (Level 2) is rather low while formal qualifications in Rock Engineering are typically at degree Level.
- The reason for South African unit standards and qualifications representing a learning path starting at lower levels is mainly due to the relatively low educational base of the majority of workers in the mining industry. These standards (and indeed the National Certificate Strata Control Level 3 Qualification) seek to address the education gap.
- The combination of geology, survey and sampling competencies into a single qualification is a unique approach that has not been seen elsewhere.

The competencies covered by the National Certificate Strata Control (Level 3) are needed by the mining industry and it is highly motivated that learners should learn towards and be assessed against the relevant standards.

Despite lack of any internationally comparable qualifications, it is nevertheless deemed a valuable and relevant qualification.

ARTICULATION OPTIONS

This Qualification allows for both vertical and horizontal articulation.

Vertical articulation exists with:

- Further Education and Training Certificate: Rock Engineering: Strata Control.

Horizontal articulation can occur between the various strata control specialisation areas, and on a unit standard level within the different NQF Level 3 qualifications, such as:

- ID 21812: National Certificate: Mining Operations: Underground Coal, NQF Level 3.

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 Standards.
- 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 or above the level of this qualification and preferably relevant workplace practical experience.
- Registration as an assessor with the relevant ETQA.

UNIT STANDARDS

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Fundamental	119472	Accommodate audience and context needs in oral/signed communication	Level 3	5
Fundamental	9010	Demonstrate an understanding of the use of different number bases and measurement units and an awareness of error in the context of relevant calculations	Level 3	2
Fundamental	9013	Describe, apply, analyse and calculate shape and motion in 2-and 3-dimensional space in different contexts	Level 3	4
Fundamental	119457	Interpret and use information from texts	Level 3	5
Fundamental	9012	Investigate life and work related problems using data and probabilities	Level 3	5
Fundamental	119467	Use language and communication in occupational learning programmes	Level 3	5
Fundamental	7456	Use mathematics to investigate and monitor the financial aspects of personal, business and national issues	Level 3	5
Fundamental	119465	Write/present/sign texts for a range of communicative contexts	Level 3	5
Core	110187	Achieve excavation stability in the presence of geological discontinuities and brows	Level 3	4

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Core	252554	Apply calculations of areas, volumes, masses and weights to simple shapes in strata control	Level 3	3
Core	244611	Apply problem-solving techniques to make a decision or solve a problem in a real life context	Level 3	2
Core	254581	Apply the risk assessment process to rock-related hazards	Level 3	3
Core	113909	Coach a team member in order to enhance individual performance in work environment	Level 3	5
Core	254575	Conduct elementary in-situ tests of support installation quality	Level 3	2
Core	115750	Demonstrate a basic understanding of the causes of falls of ground	Level 3	2
Core	115683	Demonstrate a basic understanding of the effects of drilling and blasting on the surrounding rock mass	Level 3	3
Core	115746	Demonstrate an elementary understanding of pillar characteristics, behaviour and function	Level 3	3
Core	254583	Demonstrate an elementary understanding of support units, their behaviour and application	Level 3	3
Core	115704	Demonstrate elementary knowledge and understanding of geology related to mining	Level 3	1
Core	254585	Demonstrate knowledge and understanding of rock engineering terminology, theory and mensuration	Level 3	2
Core	120337	Demonstrate knowledge pertaining to the preparation, conducting, recording and follow-up actions of a planned task observation in a working place	Level 3	2
Core	254588	Demonstrate the ability to understand and promote the implementation of rock-related mining standards as a strata control function	Level 3	3
Core	115552	Demonstrate understanding of the effects of brows on excavation stability	Level 3	2
Core	115686	Describe the effect of mining dimension on excavation stability	Level 3	3
Core	254576	Gather data from a basic level geotechnical rock mass monitoring programme	Level 3	4
Core	254578	Identify common support failure modes from observations	Level 3	3
Core	254587	Make a working place safe in a mine	Level 3	4
Core	114979	Operate a computer workstation in a business environment	Level 3	2
Core	115667	Recognise, record and report hazards associated with geological discontinuities	Level 3	3
Core	115549	Record geotechnical data and draw up a local geotechnical plan	Level 3	4
Core	120329	Respond to, implement and manage emergencies according to an emergency action plan in a workplace	Level 3	2
Core	9533	Use communication skills to handle and resolve conflict in the workplace	Level 3	3
Core	254586	Demonstrate an understanding of the effect of excessive spans and poorly installed or damaged support units on working place stability	Level 4	4
Core	254584	Identify signs of stress-induced damage in mining	Level 4	3
Core	9652	Perform geotechnical core logging and sampling in a localised known environment to provide data for mining excavation design	Level 4	8
Core	9653	Perform geotechnical mapping and sampling in a localised known environment to provide data for mining excavation design	Level 4	8
Elective	252574	Demonstrate knowledge of various slope failure modes	Level 2	2
Elective	254577	Take charge of and drive a trackless mobile machine in an underground mine	Level 2	4
Elective	254582	Assess gully stability under different geotechnical conditions	Level 3	3
Elective	115555	Conduct an inspection to evaluate ground conditions in an on-reef development excavation prior to, during and after ledging operations	Level 3	3
Elective	115545	Demonstrate an understanding of excavation stability in a rock pass	Level 3	2

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Elective	254574	Demonstrate an understanding of slope design to improve stability	Level 3	3
Elective	115670	Demonstrate elementary knowledge and understanding of multi-reef / seam environments to achieve excavation stability with support	Level 3	2
Elective	115668	Demonstrate elementary knowledge and understanding of precautions required to achieve excavation stability in remnants	Level 3	3
Elective	115673	Demonstrate elementary knowledge and understanding of rockburst prone mining operations to achieve excavation stability with support	Level 3	3
Elective	115530	Demonstrate knowledge and basic understanding of the effect of high mining heights on artificial support installation and effectiveness	Level 3	2
Elective	254589	Demonstrate knowledge and understanding of factors affecting the stability of service excavations	Level 3	3
Elective	254580	Demonstrate knowledge and understanding of the effect of seismicity on support units and workplace stability	Level 3	4
Elective	254579	Demonstrate knowledge of the effects of blasting operations on highwall/slope stability	Level 3	3
Elective	115758	Identify and evaluate the effect of seismic activity on the rock mass and support units	Level 3	4

LEARNING PROGRAMMES RECORDED AGAINST THIS QUALIFICATION

None



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:***Demonstrate an understanding of slope design to improve stability***

SAQA US ID	UNIT STANDARD TITLE		
254574	Demonstrate an understanding of slope design to improve stability		
ORIGINATOR	PROVIDER		
SGB Mining and Minerals			
FIELD	SUBFIELD		
6 - Manufacturing, Engineering and Technology	Fabrication and Extraction		
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 3	3

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

SPECIFIC OUTCOME 1

Demonstrate understanding of slopes in mining.

SPECIFIC OUTCOME 2

Demonstrate understanding of the issues that affect slope stability.

SPECIFIC OUTCOME 3

Demonstrate understanding of the information required to design slopes.

SPECIFIC OUTCOME 4

Demonstrate understanding of the slope design process.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	60369	National Certificate in Rock Engineering: Strata Control	Level 3



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:***Conduct elementary in-situ tests of support installation quality***

SAQA US ID	UNIT STANDARD TITLE		
254575	Conduct elementary in-situ tests of support installation quality		
ORIGINATOR	PROVIDER		
SGB Mining and Minerals			
FIELD	SUBFIELD		
6 - Manufacturing, Engineering and Technology	Fabrication and Extraction		
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 3	2

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

SPECIFIC OUTCOME 1

Demonstrate knowledge of the factors that influence support installation quality.

SPECIFIC OUTCOME 2

Demonstrate understanding of the basic in-situ support quality testing methods available.

SPECIFIC OUTCOME 3

Conduct elementary in-situ tests of support quality.

SPECIFIC OUTCOME 4

Communicate the results of the tests.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	60369	National Certificate in Rock Engineering: Strata Control	Level 3



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:***Gather data from a basic level geotechnical rock mass monitoring programme***

SAQA US ID	UNIT STANDARD TITLE		
254576	Gather data from a basic level geotechnical rock mass monitoring programme		
ORIGINATOR		PROVIDER	
SGB Mining and Minerals			
FIELD		SUBFIELD	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 3	4

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

SPECIFIC OUTCOME 1

Demonstrate knowledge of instrumentation and monitoring systems.

SPECIFIC OUTCOME 2

Collect, process and ensure integrity of data.

SPECIFIC OUTCOME 3

Ensure a secure data storage, archiving, back-up and distribution system.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	60369	National Certificate in Rock Engineering: Strata Control	Level 3



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:***Take charge of and drive a trackless mobile machine in an underground mine***

SAQA US ID	UNIT STANDARD TITLE		
254577	Take charge of and drive a trackless mobile machine in an underground mine		
ORIGINATOR	PROVIDER		
SGB Mining and Minerals			
FIELD	SUBFIELD		
6 - Manufacturing, Engineering and Technology	Fabrication and Extraction		
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 2	4

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

SPECIFIC OUTCOME 1

Explain the requirements to take charge of and drive a trackless mobile machine in an underground mine.

SPECIFIC OUTCOME 2

Prepare to take charge of and drive a trackless mobile machine in an underground mine.

SPECIFIC OUTCOME 3

Take charge of and drive a trackless mobile machine in an underground mine.

SPECIFIC OUTCOME 4

Perform post-driving operations.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	60369	National Certificate in Rock Engineering: Strata Control	Level 3



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:***Identify common support failure modes from observations***

SAQA US ID	UNIT STANDARD TITLE		
254578	Identify common support failure modes from observations		
ORIGINATOR	PROVIDER		
SGB Mining and Minerals			
FIELD	SUBFIELD		
6 - Manufacturing, Engineering and Technology	Fabrication and Extraction		
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 3	3

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

SPECIFIC OUTCOME 1

Demonstrate knowledge and understanding of support behaviour.

SPECIFIC OUTCOME 2

Demonstrate knowledge and understanding of various failure modes.

SPECIFIC OUTCOME 3

Observe and identify various failure modes.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	60369	National Certificate in Rock Engineering: Strata Control	Level 3



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate knowledge of the effects of blasting operations on highwall/slope stability

SAQA US ID	UNIT STANDARD TITLE		
254579	Demonstrate knowledge of the effects of blasting operations on highwall/slope stability		
ORIGINATOR		PROVIDER	
SGB Mining and Minerals			
FIELD		SUBFIELD	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 3	3

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

SPECIFIC OUTCOME 1

Demonstrate knowledge of highwall/slope blasting practices.

SPECIFIC OUTCOME 2

Demonstrate knowledge of factors that control blast damage to highwalls/slopes.

SPECIFIC OUTCOME 3

Demonstrate knowledge of blast damage and its control.

SPECIFIC OUTCOME 4

Demonstrate basic knowledge of blasting techniques to reduce blast damage.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	60369	National Certificate in Rock Engineering: Strata Control	Level 3



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate knowledge and understanding of the effect of seismicity on support units and workplace stability

SAQA US ID	UNIT STANDARD TITLE		
254580	Demonstrate knowledge and understanding of the effect of seismicity on support units and workplace stability		
ORIGINATOR		PROVIDER	
SGB Mining and Minerals			
FIELD		SUBFIELD	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 3	4

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

SPECIFIC OUTCOME 1

Demonstrate knowledge of mining-induced seismic activity.

SPECIFIC OUTCOME 2

Identify and assess the effect of seismic activity on ground conditions.

SPECIFIC OUTCOME 3

Identify and assess the effect of seismic activity on support units.

SPECIFIC OUTCOME 4

Communicate adverse conditions.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	60369	National Certificate in Rock Engineering: Strata Control	Level 3



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:*Apply the risk assessment process to rock-related hazards*

SAQA US ID	UNIT STANDARD TITLE		
254581	Apply the risk assessment process to rock-related hazards		
ORIGINATOR	PROVIDER		
SGB Mining and Minerals			
FIELD	SUBFIELD		
6 - Manufacturing, Engineering and Technology	Fabrication and Extraction		
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 3	3

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

SPECIFIC OUTCOME 1

Demonstrate a basic knowledge of the conditions that potentially result in fall of ground hazards.

SPECIFIC OUTCOME 2

Identify the hazards and determine risks associated with falls of ground.

SPECIFIC OUTCOME 3

Implement appropriate controls.

SPECIFIC OUTCOME 4

Communicate recognised hazards and associated risks.

SPECIFIC OUTCOME 5

Monitor the risk.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	60369	National Certificate in Rock Engineering: Strata Control	Level 3



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Assess gully stability under different geotechnical conditions

SAQA US ID	UNIT STANDARD TITLE		
254582	Assess gully stability under different geotechnical conditions		
ORIGINATOR	PROVIDER		
SGB Mining and Minerals			
FIELD	SUBFIELD		
6 - Manufacturing, Engineering and Technology	Fabrication and Extraction		
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 3	3

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

SPECIFIC OUTCOME 1

Prepare for gully condition assessment.

SPECIFIC OUTCOME 2

Conduct a gully condition assessment.

SPECIFIC OUTCOME 3

Record and report the assessment results.

SPECIFIC OUTCOME 4

Analyse the assessment process in terms of applicable hazards.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	60369	National Certificate in Rock Engineering: Strata Control	Level 3



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate an elementary understanding of support units, their behaviour and application

SAQA US ID	UNIT STANDARD TITLE		
254583	Demonstrate an elementary understanding of support units, their behaviour and application		
ORIGINATOR			PROVIDER
SGB Mining and Minerals			
FIELD			SUBFIELD
6 - Manufacturing, Engineering and Technology			Fabrication and Extraction
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 3	3

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

SPECIFIC OUTCOME 1

Demonstrate elementary knowledge of support principles.

SPECIFIC OUTCOME 2

Demonstrate elementary knowledge of support units and their functions.

SPECIFIC OUTCOME 3

Demonstrate elementary understanding of support unit behaviour.

SPECIFIC OUTCOME 4

Demonstrate elementary understanding of support unit installation.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	60369	National Certificate in Rock Engineering: Strata Control	Level 3



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:***Identify signs of stress-induced damage in mining***

SAQA US ID	UNIT STANDARD TITLE		
254584	Identify signs of stress-induced damage in mining		
ORIGINATOR		PROVIDER	
SGB Mining and Minerals			
FIELD		SUBFIELD	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
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

Demonstrate knowledge of the stress field around mining openings.

SPECIFIC OUTCOME 2

Demonstrate knowledge of induced stress (compressive, tensile and shear) damage in mining.

SPECIFIC OUTCOME 3

Identify signs of stress induced damage in mining.

SPECIFIC OUTCOME 4

Record and report stress induced damage in mining.

SPECIFIC OUTCOME 5

Understand the need to record, report and rectify stress induced damage in mining.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	60369	National Certificate in Rock Engineering: Strata Control	Level 3



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate knowledge and understanding of rock engineering terminology, theory and mensuration

SAQA US ID	UNIT STANDARD TITLE		
254585	Demonstrate knowledge and understanding of rock engineering terminology, theory and mensuration		
ORIGINATOR		PROVIDER	
SGB Mining and Minerals			
FIELD		SUBFIELD	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 3	2

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

SPECIFIC OUTCOME 1

Demonstrate knowledge of elementary rock engineering terminology and definitions.

SPECIFIC OUTCOME 2

Demonstrate understanding of elementary rock engineering theory.

SPECIFIC OUTCOME 3

Apply rock-engineering theory through the completion of calculations.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	60369	National Certificate in Rock Engineering: Strata Control	Level 3



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate an understanding of the effect of excessive spans and poorly installed or damaged support units on working place stability

SAQA US ID	UNIT STANDARD TITLE		
254586	Demonstrate an understanding of the effect of excessive spans and poorly installed or damaged support units on working place stability		
ORIGINATOR	PROVIDER		
SGB Mining and Minerals			
FIELD	SUBFIELD		
6 - Manufacturing, Engineering and Technology	Fabrication and Extraction		
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 knowledge and understanding of the role that support units play in maintaining working place stability.

SPECIFIC OUTCOME 2

Demonstrate knowledge and understanding of the effects of incorrect spacing of support units on inter-support spans.

SPECIFIC OUTCOME 3

Demonstrate knowledge and understanding of the effect of incorrectly installed or damaged support units on work place stability.

SPECIFIC OUTCOME 4

Identify signs of substandard support installation.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	60369	National Certificate in Rock Engineering: Strata Control	Level 3



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:***Make a working place safe in a mine***

SAQA US ID	UNIT STANDARD TITLE		
254587	Make a working place safe in a mine		
ORIGINATOR		PROVIDER	
SGB Mining and Minerals			
FIELD		SUBFIELD	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 3	4

This unit standard replaces:

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
9793	Make a working place safe in a long and short wall in a coal panel	Level 3	3	Will occur as soon as 254587 is registered
9794	Make a working place safe in a coal pillar extraction panel	Level 3	3	Will occur as soon as 254587 is registered
9795	Make a working place safe in a bord and pillar coal mining panel	Level 3	3	Will occur as soon as 254587 is registered
9797	Make a working place safe in a tabular hard rock stope in deep geo-technical conditions	Level 3	3	Will occur as soon as 254587 is registered
9798	Make a large excavation safe in shallow geo-technical conditions	Level 3	3	Will occur as soon as 254587 is registered
9799	Make a large excavation safe in deep geo-technical conditions	Level 3	3	Will occur as soon as 254587 is registered
9800	Make a workplace safe in a vertical shaft	Level 3	3	Will occur as soon as 254587 is registered
9801	Make a workplace safe in an incline or decline shaft	Level 3	3	Will occur as soon as 254587 is registered
9802	Make a workplace safe in a highwall, openpit or strip mine	Level 3	3	Will occur as soon as 254587 is registered
9803	Make a workplace safe in a tunnel development end in shallow geo-technical conditions	Level 3	4	Will occur as soon as 254587 is registered
9804	Make a workplace safe in a tunnel development end in deep geo-technical conditions	Level 3	3	Will occur as soon as 254587 is registered

SPECIFIC OUTCOME 1

Demonstrate knowledge of examination and making safe.

SPECIFIC OUTCOME 2

Prepare for visual and physical examination in order to make safe.

SPECIFIC OUTCOME 3

Conduct a visual examination.

SPECIFIC OUTCOME 4

Conduct a physical examination.

SPECIFIC OUTCOME 5

Make safe.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	60369	National Certificate in Rock Engineering: Strata Control	Level 3



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate the ability to understand and promote the implementation of rock-related mining standards as a strata control function

SAQA US ID	UNIT STANDARD TITLE		
254588	Demonstrate the ability to understand and promote the implementation of rock-related mining standards as a strata control function		
ORIGINATOR	PROVIDER		
SGB Mining and Minerals			
FIELD	SUBFIELD		
6 - Manufacturing, Engineering and Technology	Fabrication and Extraction		
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 3	3

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

SPECIFIC OUTCOME 1

Demonstrate understanding of the need for rock-related mine standards.

SPECIFIC OUTCOME 2

Demonstrate knowledge and understanding of the origin of rock-related mine standards.

SPECIFIC OUTCOME 3

Demonstrate understanding of strata control reasons for mine-specific rock-related standards.

SPECIFIC OUTCOME 4

Promote the rock-related mine standards as a strata control function.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	60369	National Certificate in Rock Engineering: Strata Control	Level 3



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate knowledge and understanding of factors affecting the stability of service excavations

SAQA US ID	UNIT STANDARD TITLE		
254589	Demonstrate knowledge and understanding of factors affecting the stability of service excavations		
ORIGINATOR		PROVIDER	
SGB Mining and Minerals			
FIELD		SUBFIELD	
6 - Manufacturing, Engineering and Technology		Fabrication and Extraction	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 3	3

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

SPECIFIC OUTCOME 1

Demonstrate knowledge and understanding of different service excavations used in the mining industry.

SPECIFIC OUTCOME 2

Demonstrate understanding of the need and importance of stable service excavations.

SPECIFIC OUTCOME 3

Demonstrate knowledge and understanding of uncontrollable factors that affect excavation stability.

SPECIFIC OUTCOME 4

Demonstrate knowledge and understanding of controllable factors that affect excavation stability.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	60369	National Certificate in Rock Engineering: Strata Control	Level 3