Occupational Curriculum:

National Occupational Qualification: Miner - Underground Hardrock

399910 - 031

Miner: Underground Hardrock

A. Curriculum Scope
B. Occupational Profile
C. Learning Component Specification
   A. Knowledge Subjects
   B. Practical Skills Modules
   C. Work Experience Modules
D. Work Experience Record
E. External Assessment Specification

<table>
<thead>
<tr>
<th></th>
<th>KNOWLEDGE</th>
<th>PRACTICAL SKILLS</th>
<th>WORK EXPERIENCE</th>
<th>TOTAL</th>
<th>WEEKS</th>
<th>MONTHS</th>
<th>YEARS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MINER</td>
<td>62</td>
<td>30%</td>
<td>68</td>
<td>80</td>
<td>38%</td>
<td>210</td>
<td>53</td>
</tr>
<tr>
<td>SHIFT SUPervisor</td>
<td>92</td>
<td>52%</td>
<td>36</td>
<td>48</td>
<td>27%</td>
<td>176</td>
<td>44</td>
</tr>
<tr>
<td>MINE OVERSEER</td>
<td>151</td>
<td>41%</td>
<td>72</td>
<td>141</td>
<td>39%</td>
<td>364</td>
<td>91</td>
</tr>
<tr>
<td>TOTAL</td>
<td>305</td>
<td>176</td>
<td>269</td>
<td>750</td>
<td>188</td>
<td>47</td>
<td>3.91</td>
</tr>
</tbody>
</table>
A. Curriculum Scope

1. Background to the Curriculum
2. Alignment with the OFO
3. Curriculum coverage in terms of progression
4. Curriculum Structure
   - Curriculum Components
   - Development Quality Partner
   - Learning programs / Qualifications that will replaced
   - Requirement for entry into the Qualification
   - Assessment Quality Partner
   - External Assessment Strategy
5. International Comparability

1. Background to the Curriculum:

The development of this curriculum was initiated by the “Mining Qualifications Authority” as part of a pilot project to develop a suite of qualifications covering the core mining activities.

This qualification covers activities directly related to blasting, additional competencies in mining operations and supervision, management and leadership that are required in order to direct and supervise the activities of first line supervisors.

Currently the National Occupational Qualification: Miner (Underground Hard Rock) (NQF Level 3) is a statutory requirement in terms of the Mine Health and Safety Act and Regulations for persons conducting blasting operations. It is the intention that this occupational qualification will replace the current registered Level 3 Qualification and that it will then serve as the vehicle to obtain the statutory license to practice as a Miner.

2. Alignment with the OFO

This curriculum includes the following Occupations as indicated on the OFO

<table>
<thead>
<tr>
<th>399910 - 031</th>
<th>Miner: Underground Hardrock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miners Underground Hard Rock: Supervise a work team in executing all work required to extract ore from a specific work area safely, economically and productively.</td>
<td></td>
</tr>
</tbody>
</table>

3. Curriculum coverage in terms of progression


The other curriculums that are being developed is set out in the matrix below:

<table>
<thead>
<tr>
<th>NQF Level</th>
<th>OFO Code</th>
<th>Occupational Title</th>
<th>Type of Qualification</th>
<th>Specialisation Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Underground Hardrock</td>
<td>Underground Coal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Surface Excavations</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Shaft Sinking</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Small Scale Mining</td>
</tr>
<tr>
<td>NQF 5</td>
<td>312101</td>
<td>Mine Overseer</td>
<td>Occupational Qualification</td>
<td>X 011</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X 012</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X 013</td>
</tr>
<tr>
<td>NQF 4</td>
<td>312101</td>
<td>Shift Supervisor</td>
<td>Occupational Qualification</td>
<td>X 021</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>X 022</td>
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<td>X 023</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X 024</td>
</tr>
<tr>
<td>NQF 3</td>
<td>312102</td>
<td>Miner</td>
<td>Occupational Qualification</td>
<td>X 031</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X 032</td>
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<tr>
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<td></td>
<td></td>
<td>X 033</td>
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<td></td>
<td></td>
<td>X 034</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td>X 035</td>
</tr>
<tr>
<td></td>
<td>312102</td>
<td>Secondary Blaster</td>
<td>Occupational Award</td>
<td>X 041</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>312102</td>
<td>Team Leader</td>
<td>Occupational Award</td>
<td>X 051</td>
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<td></td>
<td></td>
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</tbody>
</table>
4. Curriculum Structure

4.1. Curriculum Components

The following curriculum components are included in the total curriculum:

<table>
<thead>
<tr>
<th>Number</th>
<th>Title</th>
<th>NQF Level</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>399910031-KS-01</td>
<td>Operations Management and Supervision (1)</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>399910031-KS-02</td>
<td>Human Resource Management (2)</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>399910031-KS-03</td>
<td>Geotechnical Engineering (Underground Hardrock) (2)</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>399910031-KS-04</td>
<td>Engineering (1)</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>399910031-KS-05</td>
<td>Mining and Mineral Engineering (Underground Hardrock) (2)</td>
<td>3</td>
<td>33</td>
</tr>
<tr>
<td>399910031-KS-06</td>
<td>Occupational Health and Industrial Hygiene (2)</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>399910031-KS-07</td>
<td>The Law of Mines and Minerals (1)</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

**TOTAL CREDITS FOR KNOWLEDGE** 30% 62

<table>
<thead>
<tr>
<th>Number</th>
<th>Title</th>
<th>NQF Level</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>399910031-PM-01</td>
<td>1. Executing administrative duties related to the controlling and motivating of a mining production team to optimise the efficiency and productivity of the work team.</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>399910031-PM-02</td>
<td>3. Supervising and directing the activities of a mining crew to achieve a zero harm rate.</td>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>399910031-PM-03</td>
<td>4. Controlling the resources allocated to mine a section in an underground hard rock mine to reduce wastage.</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>399910031-PM-04</td>
<td>6. Supervising and executing technical tasks to conduct primary blasting in underground Hard Rock Mines.</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>399910031-PM-05</td>
<td>7. Supervising and executing technical tasks to conduct secondary blasting in underground Hard Rock Mines.</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>399910031-PM-06</td>
<td>8. Execute technical tasks and Supervise the cleaning of blasted rock from underground working areas.</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>399910031-PM-07</td>
<td>9. Supervising the execution of tasks to supply services to Stoping and Development operations in an Underground Hard Rock Mine.</td>
<td>3</td>
<td>8</td>
</tr>
</tbody>
</table>

**TOTAL CREDITS FOR PRACTICAL SKILLS** 30% 68

<table>
<thead>
<tr>
<th>Number</th>
<th>Title</th>
<th>NQF Level</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>399910031-WM-1</td>
<td>Team works effectively</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>399910031-WM-3</td>
<td>Minimum wastage</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>399910031-WM-4</td>
<td>Prevention of working in a gas hazardous environment</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>399910031-WM-5</td>
<td>Faces blasted in virgin rock</td>
<td>3</td>
<td>28</td>
</tr>
<tr>
<td>399910031-WM-6</td>
<td><strong>Secondary blasting.</strong></td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>399910031-WM-7</td>
<td>Blasted ore transported to tips and back areas</td>
<td>3</td>
<td>28</td>
</tr>
</tbody>
</table>

**TOTAL CREDITS FOR WORK EXPERIENCE** 40% 80

**Total Credits:** 210
4.2. Development Quality Partner

<table>
<thead>
<tr>
<th>Name</th>
<th>E-mail</th>
<th>Phone</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mine Qualifications Authority</td>
<td></td>
<td></td>
<td>Sector Education and Training Authority</td>
</tr>
</tbody>
</table>

4.3. Learning programs / Qualifications that will replaced

The following qualification / Learning programs will be replaced by these curriculum components as described

<table>
<thead>
<tr>
<th>Number</th>
<th>Title</th>
<th>Type</th>
<th>NQF Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>58760</td>
<td>National Certificate: Rock Breaking Underground Hard Rock</td>
<td>Unit Standard Based</td>
<td>Level 3</td>
</tr>
</tbody>
</table>

4.4. Requirement for entry into the Qualification

4.4.1. Educational - Entry Requirements

Access to this qualification is restricted in terms of the Mines Health and Safety Act and Regulations to persons who have obtained the National Certificate in Mining Operations for Underground: Hard Rock NQF Level 2. (Mining Team Leader). **Obtaining the foundational Learning Competence is a prerequisite for completion of the qualification before the external assessment can be attempted.** It is preferable that candidates should already have adequate work experience as a first line supervisor in underground mining operations before embarking on learning towards this qualification.

4.4.2. Physical - Entry Requirements

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

4.4.3. Legal - Entry Requirements

**Meet any requirements specified by the Explosives Act or any other relevant legislative requirements.**
4.5. Assessment Quality Partner

Name
MQA in Collaboration with the Chamber of Mines and The Department of Mineral Resources.

4.6. External Assessment Strategy

The external assessment will take the form of a written assessment for the required theory components, observations of identified practical tasks and a panel interview to test the integrated application of the required skills. The DMR also indicated that the external assessment will also serve as the assessment for the license to practice. At this work session it was also agreed that the Assessment Quality Partner will be made up of a formal structure, co-ordinated and led by the MQA. The structure will consist of the MQA, DMR and industry representatives. The assessment panel will consist of recognised practitioners.

<table>
<thead>
<tr>
<th>CRITERIA FOR REGISTERING EXTERNAL ASSESSMENT CENTRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the site is also a learning provider there must be clear separation of responsibility and authority to guarantee objectivity. The assessment boards/panel must be made up of members that will guarantee objectivity.</td>
</tr>
<tr>
<td>The site must have access to simulated or controlled mining environments appropriate to assess the identified practical tasks.</td>
</tr>
<tr>
<td>Access to an adequate numbers of external registered assessors and moderators registered by the AQP.</td>
</tr>
<tr>
<td>Suitable administrative and record keeping resources and facilities as well as access to the authorised computer database and system.</td>
</tr>
<tr>
<td>Financial viability approved by the AQP.</td>
</tr>
<tr>
<td>Meet all relevant legislative requirements pertaining to the Mining and minerals sector.</td>
</tr>
</tbody>
</table>
a. Criteria for external assessors

<table>
<thead>
<tr>
<th>CRITERIA FOR REGISTERING EXTERNAL ASSESSORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessors must be registered against requirements set by the AQP for assessment practice.</td>
</tr>
<tr>
<td>Assessors must be in possession of a valid blasting certificate or Rock Breaker Certificate for the class of mine or qualification prescribed for this purpose.</td>
</tr>
<tr>
<td>Assessors must be recognised as subject matter expert practitioners supervising miners and/or people training miners with at least five years practical experience. (Minimum at the level of Shift Supervisor)</td>
</tr>
</tbody>
</table>

5. International comparability

PUT IN THE STUFF FROM THE US BASED QUALIFICATIONS.
B. Occupational Profile

399910 - 031 - Miner: Underground Hardrock

**Occupational Purpose:**
Miners Underground Hard Rock: Supervise a work team in executing all work required to extract ore from a specific work area safely, economically and productively.

**Occupational Tasks:**

1. Executing administrative duties related to the controlling and motivating of a mining production team to optimise the efficiency and productivity of the work team.
2. Supervising and directing the activities of a mining crew to achieve a zero harm rate.
3. Controlling the resources allocated to mine a section in an underground hard rock mine to reduce wastage.
5. Supervising and executing technical tasks to conduct primary blasting in underground Hard Rock Mines.
7. Execute technical tasks and Supervise the cleaning of blasted rock from underground working areas.
8. Supervising the execution of tasks to supply services to Stoping and Development operations in an Underground Hard Rock Mine.

1. Executing administrative duties related to the controlling and motivating of a mining production team to optimise the efficiency and productivity of the work team. (NQF Level: 3)

**Unique Product or Service**
Team works effectively

**Knowledge Focus**

- (MUHR) Mine logistics and management procedures relating to stores ordering and material procurement. (Intermediate)
- (MUHR) Principles of good administrative procedures (Basic)
- (MUHR) Mine reporting and management processes and procedures (Inter shift handover, incident reporting, etc.) (Intermediate)
- (MUHR) Principle of planning and problem solving (Intermediate)
- (MUHR) Legislative requirements relating to labour control (Basic)
- (MUHR) The principles of team supervision and motivation. (Intermediate)
- (MUHR) Concepts associated with the leadership of diverse (Culture, gender, age, orientation, religion, political viewpoint) work teams (Basic)
- (MUHR) Concepts and principles associated with employee wellness (Basic)
- (MUHR) Concepts and principles of group and individual conflict handling (Basic)
- (MUHR) Legal requirements relating to discipline and grievance handling (Intermediate)
- (MUHR) Principles, concepts and practices of effective communication and job instruction (Intermediate)
• (MUHR) Concepts and principles of supervising work teams (Intermediate)
• Principles of managing personal development

**Occupational Responsibility**
Execute start of shift procedures and administrative duties. Complete daily production report. Report all breakdowns, incidents, accidents, material, explosives, all emergency preparedness documentation and labour requirements. Execute and complete planned task observations, safety declarations and equipment checklists. Interpret and take appropriate action i.t.o. safety, ventilation, strata control and survey reports. Maintain a Miners Notebook. Motivate the team to produce effectively. Identify training needs and do on job coaching. Explain the bonus scheme. Give direct and proper work instructions. Explain and model the values of the organisation. Identify potential team wellness problems and refer for corrective action. Deal with employee queries and complaints of team members.

**Practical Skills**

• (MUHR) Execute basic calculations required for reporting and ordering
• (MUHR) Clearly communicate using a telephone and/or two way radio
• (MUHR) Read, interpret and update a mine plan.
• (MUHR) Read, interpret and complete all required forms and reports. Complete planned task observations and investigation documents to the required quality standard.
• (MUHR) Execute all start and end of shift procedures
• (MUHR) Conduct motivational discussions with work teams
• (MUHR) Identify the root cause of problems in sections and recommend appropriate corrective actions.
• (MUHR) Handle withdrawals from dangerous workplaces

**Occupational Context**
This task is done for a designated underground work area. Complete the reports in writing and verbally report to the Production/Operations Supervisor. Collaborate with all service departments. Work with the relevant Shop Steward and Safety representative.

**Work Experience**

• (MUHR) Order, receive and store explosives and explosive accessories.
• (MUHR) Conduct Planned task observations and inspections
• (MUHR) Over inspection of all pre use checklists
• (MUHR) Conduct team meetings

**Specific Workplace Knowledge**

• Mine specific HR and Safety policies and procedures.
• Mine rules and procedures regarding labour and access control.
• Mine specific document control procedures
• Mine ordering and procuring procedures and standards.
• Mine specific programmes and initiatives relating to Employee wellness
  • **Mine involvement in local community development**
• Mine specific discipline and grievance procedures
• Mine policy and procedures regarding incentive schemes and the protocols for responding to queries and complaints.

2. Supervising and directing the activities of a mining crew to achieve a zero harm rate. (NQF Level: 3)

Unique Product or Service
Zero harm

Knowledge Focus

• (MUHR) The definitions of safety related terminology as specified in the Mine Health and Safety Act. (Intermediate)
• (MUHR) Concepts and applications of strata control principles in an underground hard rock mine (Intermediate)
• (MUHR) Principles of hazard identification and continuous risk assessment (Intermediate)
• MUHR) The competencies required of staff making up a mining crew. (Advanced)
• (MUHR) Concepts and principles associated with formal and informal discipline handling (Basic)
• (MUHR) Relevant parts of the Mine Health and safety act and regulations related to Falls of Ground prevention and declaring working places safe (Intermediate)
• (MUHR) The principles of people performance and motivation and the potential causes of poor performance. (Basic)
• (MUHR) Principles of maintenance and construction in mines (Basic)
• (MUHR) The principles and concepts of the mechanical operation of mining equipment (Basic)
• (MUHR) The principles and concepts of the electrical operation of mining equipment (Basic)
• (MUHR) Origin, properties, effects, occurrence, limits and treatment of harmful gasses (Intermediate)
• (MUHR) Concepts and preventative measures and treatment with regard to heat related symptoms and workplace conditions. (Advanced)
• (MUHR) Specified requirements pertaining to basic health and safety practices (Intermediate)
• Basic first aid
• Concepts and principles of accident/incident reporting and investigations
• Practices related to emergency preparedness
• Concepts and practices of examining, making and declaring workplaces safe
• Concepts and principles of environmental control in an underground hardrock mine

Occupational Responsibility

Conduct start of shift safety meetings. Conduct ongoing examinations and inspections of workplaces. Declare workplaces safe. Oversee the examination of machinery. Evaluate and check the competency level of people before allocating work to them. Conduct on job coaching of employees regarding work practices. Conduct task observations. Identify the causes for people not working according to standard. Initiate corrective action where required. Oversee the use of pre use checklists. Continually emphasise safety and give safety tips and hints.
Examine and Monitor the use of approved material and tools. Oversee compliance with mine standards and work practices.

Practical Skills

- (MUHR) Conduct safety meetings and present safety information at team based safety meetings.
- (MUHR) Test for various types of harmful gasses and take appropriate action.
- (MUHR) Conduct inspections of underground working areas report findings and initiate appropriate corrective action.
- (MUHR) Conduct on job training/coaching of team members.
- (MUHR) Counsel employees and correct sub standard performance and give verbal warnings where required.
- (MUHR) Identify the potential sources of conflict in a work team and take action to prevent and resolve conflict.

Occupational Context
This task is done for a designated work area in an underground mining environment. Report to a Shift Boss. This task is done in collaboration with the Safety officers and Safety Representatives. Get support from Training, HR and Geology departments. Complete forms and reports as part of the Mine Health and Safety System. (Written/Electronic) Miner carries a legal appointment in terms of the Mine Health and safety act.

Work Experience

- (MUHR) Conduct safety meetings
- (MUHR) Take occupational hygiene measurements
- (MUHR) Test for various types of harmful gasses

Specific Workplace Knowledge

- Mine specific work procedures and standards applicable to support, ventilation, temperature control, gasses, water control, barring, explosives control and heat illnesses.
- The mine disciplinary procedures and codes.
- Company equipment maintenance policies and procedures.
- The list of approved material and equipment.
- Mine safety and emergency preparedness/response policies and procedures

3. Controlling the resources allocated to mine a section in an underground hard rock mine to reduce wastage. (NQF Level: 3)

Unique Product or Service
Minimum wastage

Knowledge Focus

- (MUHR) Quantities of material, equipment and machinery required to execute all the mining activities (Intermediate)
• (MUHR) Economics in the mining industry (Basic)
• (MUHR) Roles and functions of all the service departments and how they support the work of the miner (Basic)
• (MUHR) Principles of the efficient utilisation of labour (Labour efficiencies) (Intermediate)

**Occupational Responsibility**
Place orders for consumables required for a production section. Control the use of labour and working hours. Control the effective utilisation of equipment and machinery to minimise damage to equipment and property.

**Practical Skills**

• (MUHR) Identify wastage in a section and plan how it can be reduced.
• (MUHR) Plan to achieve given labour efficiencies for specific work areas

**Occupational Context**
This task is done for all consumables, material, equipment and labour required to mine a underground hard rock section. Includes lost blasts, over breaking and under breaking and mining off reef.

**Work Experience**

• (MUHR) Exposure to the monthly planning processes
• (MUHR) Exposure to the relevant services departments (Rock Engineering, Environmental, Safety and Survey) (35 shifts total)

**Specific Workplace Knowledge**

• Mine specific standards regarding services layouts.
• Mine specific planned maintenance schedule

4. **Supervising and conducting gas testing in underground Hard Rock Mines.**
   *(NQF Level: 3)*

**Unique Product or Service**
Prevention of working in a gas hazardous environment

**Knowledge Focus**

• (MUHR) Properties, characteristics, origin, occurrences, effects and permissible legal limits of the various harmful gasses (Advanced)
• (MUHR) Operating and calibration principles for the critical range of testing instruments (Advanced)
• (MUHR) Theory of when and where to test for harmful gasses (Advanced)
• (MUHR) Actions to take in dealing with harmful gasses when detected (Advanced)
• (MUHR) Conditions under which flammable gasses might ignite. (Contraband, defective electrical installations, blasting operations, friction etc.) (Advanced)
• (MUHR) Impact and implications of underground explosions and appropriate responses (Intermediate)
Occupational Responsibility
Receive and examine gas testing equipment and ensure that the equipment is in good working order. Take proper care of the equipment. Use gas testing equipment to test for harmful gasses. Continuously monitor the environment. Take corrective action where necessary and report accordingly. Return equipment and report malfunctions at end of shift.

Practical Skills
- (MUHR) Conduct pre-use checks on gas testing instruments, identify problems and report.
- (MUHR) Test for harmful gasses in various underground environments, situations and stages of the mining process.
- (MUHR) Respond to and deal with a full range of situations where harmful gasses are detected.
- (MUHR) Return and report on the condition of gas testing instruments.

Occupational Context
This task is executed for the full cycle of using the gas testing instruments. It excludes the calibration of the instruments. Incumbents must be exposed to the range of commonly used instruments. The task includes the following situations: intersecting water, ventilation stoppages, working in close proximity to abandoned areas, hoiling into unventilated workings, all stages of the blasting cycle, entry examination. etc)

Work Experience
- Check the Calibration of gas testing instruments.
- Exposed to the range of commonly used instruments.
- Test for gas during all stages of the blasting cycle.

Specific Workplace Knowledge
- Mine specific standards and equipment requirements.

5. Supervising and executing technical tasks to conduct primary blasting in underground Hard Rock Mines. (NQF Level: 3)

Unique Product or Service
Faces blasted in virgin rock

Knowledge Focus
- (MUHR) Legal terms and requirements relating to rock breaking operations (Advanced)
- (MUHR) Purpose, structure and application of the Mine health and Safety act and regulations relating to handling explosives (Regulation 4) (Advanced)
- (MUHR) Relevant requirements in terms of the explosives act (Basic)
- (MUHR) Key concepts and principles for installing and testing the various initiating systems used in blasting operations (Advanced)
- (MUHR) Concepts and principles associated with quality blasting practices (Advanced)
• (MUHR) Principles of strata control as applied in underground hard rock mines (Advanced)
• (MUHR) Concepts, principles and installation methods for various types of underground support. (Advanced)
• (MUHR) Features and characteristics and application of various types of explosives and accessories. (Advanced)
• (MUHR) Identification, treatment and removal of misfires (Advanced)
• (MUHR) Principles and practices for the destruction of old explosives (Advanced)
• (MUHR) Principles of mechanical practice for mining equipment (Intermediate)
• (MUHR) Principles of electrical installations related to the mining operations (Basic)
• (MUHR) Concepts, principles and processes of the full range of mining methods and practices. (Advanced)
• (MUHR) Marking of shot holes for primary blasting (Advanced)
• (MUHR) Receive, handle, store, transport and control explosives and accessories (Advanced)
• (MUHR) Blasting down of hazardous ground (Advanced)
• (MUHR) Concepts and principles of mine geology (Intermediate)

**Occupational Responsibility**

Conduct start of shift meeting with a team at the waiting place. Over inspect the entry examination and declare the workplace safe. Mark the positioning of support and oversee the installation of temporary and permanent support. Supervise the preparation of the face for blasting. Inspect face and deal with misfires and sockets. Mark the position, direction and dip of blasting holes. Oversee the checking of the operational readiness of drilling equipment. Oversee the drilling of blasting holes for direction, depth and dip. Order, collect, transport and store explosives and accessories and update explosive controls. Oversee the preparation of the face for drilling. Oversee the preparation of primers, charging up operations, timing and connect. Initiate the blast. Follow end of shift procedures.

**Practical Skills**

• (MUHR) Plan and execute the daily mining cycle.

**Occupational Context**

Operate within a mining cycle as required by the mine. Blast a set number of faces. Operate with drill rigs and hand held rock drills. Charge up with vehicles or manual depending on the type of explosive. Work closely with Engineering, Ventilation, geology and rock engineering departments.

**Work Experience**

• Blast a set number of faces.

**Specific Workplace Knowledge**

• Mine specific safety communication policies and procedures (Safety Topics)
• Mine specific operating procedures and standards associated with mining activities.
• Mine specific disciplinary and grievance procedures.
• Mine specific bonus scheme
6. Supervising and executing technical tasks to conduct secondary blasting in underground Hard Rock Mines. (NQF Level: 3)

Unique Product or Service
Rock blasted

Knowledge Focus

- (MUHR) Breaking big rocks by means of secondary blasting
- (MUHR) Marking shot holes for secondary blasting
- (MUHR) Identification, treatment and removal of misfires (Advanced)
- (MUHR) Legal terms and requirements relating to rock breaking operations (Advanced)
- (MUHR) Features and characteristics and application of various types of explosives and accessories. (Intermediate)
- (MUHR) Principles of strata control as applied in underground hard rock mines (Basic)
- (MUHR) Removal of obstructions in rock passes (Advanced)
- (MUHR) Install and test the various initiating systems used in blasting operations (Advanced)
- (MUHR) Receive, handle, store, transport and control explosives and accessories (Advanced)
- (MUHR) Blasting down of hazardous ground (Advanced)
- (MUHR) Placing of explosives

Occupational Responsibility

Practical Skills

- (MUHR) Break big rocks by means of secondary blasting.
- (MUHR) Remove obstructions in ore passes.
- (MUHR) Blast down hazardous ground.

Occupational Context
This task is executed for the breaking of oversized rock and the clearing of obstructions in ore passes. Use is made of various types of explosives, accessories and initiating systems as well as specialised equipment for clearing overhangs and ore passes.

Work Experience

- Breaking of oversized rock
- Clear obstructions in ore passes.

Specific Workplace Knowledge

- Mine specific standards

7. Execute technical tasks and supervise the cleaning of blasted rock from underground working areas. (NQF Level: 3)
Unique Product or Service
Blasted ore transported to tips and back areas

Knowledge Focus

- (MUHR) Concepts, principles and processes of underground mine layouts and logistics. (Intermediate)
- (MUHR) Principles of the mechanical cleaning operations and equipment (Intermediate)
- (MUHR) Legal requirements for operating machinery and equipment (Intermediate)
- (MUHR) Concepts and principles of team supervision (Intermediate)
- (MUHR) Principles of the proper maintenance of cleaning arrangements and infrastructure (Intermediate)

Occupational Responsibility
Read and interpret the blasting reports to plan the cleaning operation for the shift. Check availability and condition of cleaning equipment. Supervise the cleaning operations. Follow up and report on equipment breakdowns. Monitor and report progress with cleaning. Supervise end of shift procedures.

Practical Skills

- (MUHR) Compile a work plan and schedule to clean underground workplaces and supervise the implementation of the plan.

Occupational Context
Done for a designated work area. Reports to the Shift Supervisor. Interface with specific miners, Engineering Department (Workshop) and Control Room.

Work Experience

- (MUHR) Supervise Cleaning operations for a period of 20 shifts on stoping
- (MUHR) Supervise cleaning operations for a period of 20 shifts on development

Specific Workplace Knowledge

- Mine standards and procedures for end of shift.
- Mine standards and procedures regarding cleaning operations.

8. Supervising the execution of tasks to supply services to Stoping and Development operations in an Underground Hard Rock Mine. (NQF Level: 3)

Unique Product or Service
Services available

Knowledge Focus

- (MUHR) Concepts associated with building work including masonry and working with concrete. (Basic)
- (MUHR) Principles and concepts of rigging, lifting and moving of material and equipment (Intermediate)
• (MUHR) Mine reticulation systems and column support practices (Basic)
• (MUHR) Concepts and principles associated with waste water management in an underground hard rock Mine (Intermediate)
• (MUHR) Principles of electrical installations and devices (Basic)
• (MUHR) Principles for the construction of traveling and escape ways (Intermediate)
• (MUHR) Operating principles of different material transport systems (Intermediate)

Occupational Responsibility
Plan material and equipment requirements. Inspect and prepare work areas. Supervise work activities. Conduct planned inspections on constructions and installations. Apply good housekeeping practices on all installations and constructions. Update schedules and report progress.

Practical Skills
• (MUHR) Identify, plan and supervise the construction and supply of services to a mining section.

Occupational Context

Work Experience
• Supervise the construction and supply of services to a mining section for a period of two production months.

Specific Workplace Knowledge
• Mine standards for ventilation and reticulation
• Mine specific standards regarding signage and color coding
Knowledge Subjects

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**399910031-KS-2: Operations Management and Supervision (2)**

The focus of the learning in this subject is on building understanding of the key theoretical concepts and principles underpinning the issues relating to management and supervision that a Miner will have to deal with. The learning includes references to the typical management, administrative and reporting processes used on mines.

**1. (MUHR) Principles of good administrative procedures (Basic) (Credits: 1)**

Learning Activity Guidelines:

- 1. Explain the definition of administrative procedures: a. Daily reports used, registers and documents. b. Description of good - (Completeness, accuracy, at correct times using the correct documents.)
- 2. Describe the link between good administration and reporting: a. Impact on reporting; b. Need to keep a paper trail for audit purposes; c. Keeping and maintaining logbooks and/or registers.
- 3. Describe the link between good administrative practices and safety requirements: a. Use of quality management systems; b. Impact on incident and accident investigations.
- 5. Explain the concepts of ethical reporting: a. Need for honesty; b. Need for accuracy; c. Link with organisational vision and values; d. Relationship between ethics and norms (popular vs the correct behaviour)
- 6. Explain the need for good administration in the execution and adhering to start and end of shift procedures, the documents to complete and the need to properly execute these procedures:
- 7. Describe self management and the role of effectively managing self and others.
- 8. Explain the need for effective reporting, what reports must be done and what the reports are used for.
2. (MUHR) Mine reporting and management processes and procedures (Inter shift handover, incident reporting, etc.) (Intermediate) (Credits: 1)

Learning Activity Guidelines:

- 1. Explain the use and interpretation of basic management information systems for miners: a. Concept of short interval control; b. Use of visual management principles; c. Use and interpretation of codes of practices to set the standards for the workplace; (Ventilation report, rock engineering report, accident and incident report, safety reports, geotechnical report, blasting schedule, regulated appointments, explosives control report)
- 2. Explain the Importance and practices associated with inter shift and in shift handover: a. The need for proper inter shift handover and the consequences of non adherence. b. Key aspects to be communicated between shifts and the risks and consequences of not communicating all information.
- 3. Describe typical reports, processes and procedures used on mines and how they impact a mine and the role of the miner in managing them;
- 4. Identify the key aspects from the reports and management information: a. Workplace hazards identified and other instructions which should always be dealt with and reported.

3. (MUHR) Principle of planning (Intermediate) (Credits: 1)

Learning Activity Guidelines:

- 1. Explain the types of plans and planning cycles: a. Short term planning (Daily, weekly and monthly); b. Techniques of setting of targets. (SMART).
- 3. Describe the principles of time management: a. Criteria for defining what is important and what is urgent; b. Techniques of planning your day to achieve the best results.
- 4. Describe how planning fits into the typical management processes (POLC); a. Concept of the typical management functions and activities; b. Impact of planning on productivity and time management; c. Causes and consequences of poor planning and how to avoid them.
4. (MUHR) Concepts associated with the leadership of diversity. (Culture, gender, age, orientation, religion, political viewpoint) work teams (Basic) (Credits: 1)

Learning Activity Guidelines:

- 1. Describe the definition of teams; a. Difference between groups of people and effective work teams; b. The role of leadership in managing diversity in the workplace. c. How to develop values that promote synergy in teams.
- 2. Describe the definition and impact of diversity on work teams: a. The various elements of diversity; b. What is meant by stereotyping and how it impacts on group dynamics; c. Techniques for managing and working with diversity in a work team.
- 3. Explain the legislative framework related to issues of diversity; a. Reference to the Bill of Rights; b. Link to the labour legislation (Just a mention that it is there); c. Need for appropriate policies and procedures.

5. (MUHR) Economics in the mining industry (Basic) (Credits: 1)

Learning Activity Guidelines:

- 2. Explain how the economy works: a. Key economic terms (expenditure, revenue/income, profit and loss(exchange rate, market influences), profit distribution, budgets); c. Supply and demand and the influence on market prices.
- 4. Describe the influence that the miner has on cost and revenue: a. Role of miner in controlling wastage b. Cost of accidents and incidents. c. Determining and controlling efficiencies and productivity (Managing the productive use of the available work time.)
- 5. Describe the miner's role in managing the quality of the product and how this impacts on the profitability and sustainability of the mine. (Blast fragmentation, over-break, under-break, stope width control, quality of sweepings)

6. (MUHR) Principles, concepts and practices of effective communication and job instruction (Intermediate) (Credits: 1)

Learning Activity Guidelines:

- 1. Describe the definition of communication: a. What is meant by effective communication; b. Different types of communication (verbal and non verbal) c. Barriers to communication.
- 2. Explain the importance of effective communication (getting the correct feedback) and job instruction: a. Consequences of poor communication; b. Indicators of ineffective
3. Explain the techniques for giving proper job instruction: a. Five w's and H of good instructions; b. Ensuring clarity of instructions; c. Making instructions simple (KISS); d. Techniques to develop good written instructions.

4. Describe the technical terms and mining jargon: a. Making sure that people understand the terms.

5. Explain the importance of seeking feedback and listening to people: a. Types of feedback b. Importance of personally checking understanding and following up on communication and instructions; c. Techniques of sharing negative issues and having the difficult discussions with team members. d. Techniques for improving the ability to listen.

6. Explain the typical communication channels and role players in communication: a. Effectiveness of the reporting structure; b. Structures to facilitate effective communication; c. Role players in communication (Organised labour, safety representatives etc.)

7. (MUHR) Concepts and principles of supervising work teams (Intermediate) (Credits: 3)

Learning Activity Guidelines:

1. Describe the definition of supervision: a. What is a supervisor; b. General functions of the supervisor (Planning, Organising, Leading, Controlling); d. Specific responsibilities of the supervisor; e. Obtaining and using power and authority; f. Characteristics of an effective supervisor. (Effective Delegation);

2. Explain the challenges that the supervisor faces in the mining industry: a. Ensuring legal compliance and making appropriate decisions; b. Caring for a work team in a hazardous environment; c. Ensuring high quality work; d. Managing time and achieving productive results from all team members; e. Supporting the team and working in an ever changing environment.

3. Explain how to motivate team performance: a. Theory of motivation; b. Factors that impact on employee motivation; c. The role of the supervisor in motivating team members; d. Techniques to deal with de-motivated employees; e. The importance of self motivation.

4. Explain how to deal with poor performance: a. Processes and techniques of identifying the causes of poor performance; b. Typical actions to take in dealing with the common causes of poor performance; c. Typical processes for improving performance; d. What to do if performance does not improve.

8. (MUHR) Roles and functions of the key service departments and how they support the work of the miner (Basic) (Credits: 1)

Learning Activity Guidelines:

1. Explain the typical mining organisation structure: a. The typical production flow found on mines; b. Overview of the purpose and function of the various departments; c. How
the service departments support the work of the miner.

Total Credits: 10

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Exemptions

Qualification or Learning programs that can give you exemption for this Module:

Critical Knowledge Areas:
The areas of knowledge that must be fully understood to be deemed competent

2. Concepts of ethical reporting: a. Need for honesty; b. Need for accuracy; c. Link with organisational values; d. Relationship between ethics and norms (popular vs the correct behaviour)
3. The need for good administration in the execution and adhering to start and end of shift procedures the documents to complete and the need to properly execute these procedures:
4. Importance and practices associated with inter shift and in shift handover: a. The need for proper inter shift handover and the consequences of non adherence. b. Key aspects to be communicated between shifts and the risks and consequences of not communicating all information.
5. How planning fits into the typical management processes (PLOC); a. Concept of the typical management functions and activities; b. Impact of planning on productivity and time management; c. Causes of poor planning and how to avoid them.
7. How socialisation influences perceptions of diversity: a. What is meant by socialisation (The influence of society and cultural values on mindsets and viewpoints); b. The role of socialised viewpoints in the workplace; c. How to develop values that promote synergy in teams.
8. Definition of supervision; a. What is a supervisor; b. General functions of the supervisor (Planning, Organising, Leading, Controlling); d. Specific responsibilities of the supervisor; e. Obtaining and using power and authority; f. Characteristics of an effective supervisor.
10. Typical organisation structure of mines: a. The typical production value chain found on mines; b. Overview of the purpose and function of the various departments; c. How the
service departments support the work of the miner.

### 399910031-KS-4: Human Resource Management (2)

The focus of the learning in this subject is on building understanding of the theories and concepts underpinning the execution of the Human resource Management work that the miner must execute. The learning includes reference to the relevant legislation and codes of good practice without covering these in detail.

#### 1. (MUHR) Concepts and principles associated with employee wellness (Basic) (Credits: 1)

**Learning Activity Guidelines:**

- 1. Describe the requirements relating to the health status of the workforce: a. Definition and effects of having ill health (HIV/AIDS, TB, DUST RELATED ILLNESSES) vision and hearing, blood pressure, cholesterol, alcohol and drug abuse b. Importance of voluntary testing c. Confidentiality clause d. Preventative measures
- 2. Explain the concept of employee wellness: a. Definition of employee wellness and the evolution of wellness programmes in the mining industry; b. Purpose of wellness programmes; c. Different employee wellness programmes d. Role of the Miner in supporting employee wellness.
- 3. Explain the legislative requirements that impact on labour control as set out in the basic conditions of employment act. (Working hours, overtime, leave)

#### 2. (MUHR) Concepts and principles of group and individual problem solving and conflict handling (Basic) (Credits: 2)

**Learning Activity Guidelines:**

- 1. Describe the definition of conflict: a. Description of conflict and the difference between constructive and destructive conflict; b. Causes of conflict and how conflict manifests itself in the workplace (difference in values, attitudes and perceptions, communication blockages, lack and distribution of resources, personality differences, lack of training) c. Criteria for effective conflict management.
- 2. Describe how to handle conflict a. Typical processes for conflict handling (Accommodation, avoidance, giving in, use competition; flight, working through the issues); b. Consequences of ignoring conflict; c. Techniques for dealing with group and individual conflict.
- 4. Explain the responsibilities for conflict management: a. The role of organised labour
and shop stewards; b. Role of the Human Resources function. c. Role of the supervisor and line management.


- 6. Explain how to ensure sustained positive and productive interpersonal relationships in workplaces: a. Description of productive interpersonal relationships (Labour peace, social justice, co-operation) b. Process of monitoring and following up

3. MUHR) The competencies required of staff making up a mining crew. (Advanced) (Credits: 1)

Learning Activity Guidelines:

- 1. Describe the definition of what is meant by competence: a. The elements of a competent person (Knowledge, skills and attributes); b. Overview of the legislative requirements regarding declaration of competence (Chapter 22 and 14 of the Regulations to the Mines Health and Safety act)
- 2. Describe the definition of declaring employees competent: a. Why is it important to have competent people working in the team; b. The process of declaring people competent; c. The consequences of allowing people to work if they have not been declared competent or doing work that they have not been declared competent.
- 3. Explain the specific competencies: a. Typical make up of a mining work team; b. Skills and knowledge required by each team member; c. Actions that must be taken when people are not yet competent. c. Requirements for license to practice.
- 5. Explain the need for personal growth and development and the concept of "Life Long Learning": a. Ongoing changes in technology requires ongoing personal development; b. Setting personal career targets and planning own growth; c. The importance of keeping up to date regarding what is happening in the industry.
- 6. Explain the importance of personal financial planning: a. Planning for your own wealth creating; b. The need to save and set personal financial budgets; c. The importance of getting good advice; d. Manage your debt
- 7. Describe how the national qualification process works and how the industry training institutions fit into that structure: a. Definition of the key terms; b. role and function of the key structures; Industry and company learning and development processes

4. (MUHR) Concepts and principles associated with formal and informal discipline handling (Basic) (Credits: 1)

Learning Activity Guidelines:
1. Describe the definition of discipline handling: a. Description of formal and informal discipline; b. Principle underpinning discipline (difference between punitive and corrective discipline)

2. Explain the legal resources and requirements pertaining to discipline: a. Concept of unfair labour practice as described in the Labour Relations Act. b. Application of the codes of good practice; c. Legislative dispute resolution structures. (Labour Court, CCMA, Labour Appeals.)

3. Explain how to ensure substantive and procedural fairness: a. Process for initiating and conducting formal and informal discipline. b. Various roles in the disciplinary process (Initiator, witness, chairperson, observer, organised labour) c. Rights and responsibilities of employees when they are being disciplined.

Total Credits: 6

Exemptions

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Critical Knowledge Areas:
The areas of knowledge that must be fully understood to be deemed competent

1. Describe the requirements relating to the health status of the workforce: a. Definition and effects of having ill health (HIV/AIDS, TB, vision and hearing, blood pressure, cholesterol, alcohol and drug abuse) b. Importance of voluntary testing c. Confidentiality clause d. Preventative measures

2. Describe how to handle conflict a. Typical processes for conflict handling (Accommodation, avoidance, giving in, use competition; flight, working through the issues); b. Consequences of ignoring conflict; c. Techniques for dealing with group and individual conflict.

3. Explain the responsibilities for conflict management: a. The role of organised labour and shop stewards; b. Role of the Human Resources function. c. Role of the supervisor and line management.

4. Describe the definition of what is meant by competence: a. The elements of a competent person (Knowledge, skills and attributes); b. Overview of the legislative requirements regarding declaration of competence (Chapter 22 and 14 of the Regulations to the Mines Health and Safety act)

5. Explain the specific competencies: a. Typical Human Resources make up of a mining work team; b. Skills and knowledge required by each team member; c. Actions that must be taken when people are not yet competent. c. Requirements for licence to practice.

(Initiator, witness, chairperson, observer, organised labour) c. Rights and responsibilities of employees when they are being disciplined.

7. Describe the principles of personal time management: a. Criteria for defining what is important and what is urgent; b. Techniques of planning your day to achieve the best results; c. The link between wellness and personal success.

399910031-KS-5: Geotechnical Engineering (Underground Hardrock) (2)

The focus of the learning in this subject is on building understanding of the underpinning theory related to rock strata and the methods of controlling rock instability in underground hard rock mines. The learning includes the concepts and principles regarding the installation and maintenance of systematic support in mines.

1. (MUHR) Concepts and applications of strata control principles in an underground hard rock mine (Intermediate) (Credits: 4)

Learning Activity Guidelines:

- 2. Explain the Naturally occurring Geological discontinuities: a. Influences of forces on rock strata. b. Definitions of the various types of discontinuities in rocks (faults, slips, joints, fold, dykes, sills, potholes, weathering, fissures, hydraulic and pneumatic pressures, bedding planes, bed separation); c Hazards and risks associated with the various geological discontinuities.
- 3. Explain Mining induced geological disturbances: a. Definition of mining induced disturbances (bed separation, brows, rock stresses, fracturing, and loose rock); b. Causes of mining induced disturbances (Incorrect mining practices, exceeding mining parameters, induced forces) c. Consequences of mining induced disturbances on rock strata.
- 4. Explain how to identify rock strata conditions: a. How to identify Natural as well as induced discontinuities and anomalies; b. How to interpret the impact of the various discontinuities and anomalies.
- 5. Introduction to the control principles: a. Various actions to mitigate the impact on strata conditions and the work environment.

2. (MUHR) Concepts, principles and installation methods for various types of
underground support. (Advanced) (Credits: 2)

Learning Activity Guidelines:

- 1. Purpose of support in managing strata conditions: a. Reasons for installing support in underground workings; Impact of unsupported areas.
- 2. Types of different support and support methods: a. Difference between active and passive support; b. Difference between primary and secondary support; c. Temporary and permanent support d. Description of the various support types. (Pack support systems, elongated support systems, Pillars, Backfill, rock bolting, sets, Wire mesh and lacing)
- 3. Application and installation of the various types of support:
- 4. Monitoring and maintaining the effectiveness of primary and secondary support:

3. (MUHR) Concepts and principles of mine geology, sampling, survey and valuation (Intermediate) (Credits: 2)

Learning Activity Guidelines:

- 1. Introduction to geology: a. Terms and definitions used in mine geology (Stratification of ore deposits, reef, on reef, internal waste, external waste, channel width); b. Rocks associated with various mineral deposits;
- 2. Describe the roles of the Geologist and how the Geology department support the work of the miner;
- 3. Describe the purpose of mine sampling and the role of the sampler;
- 4. Explain the information on a sampling report with respect to correct stoping width and channel width and grade and indicate how the reports are used.
- 5. Calculate areas and volumes and indicate the role of the survey function on the mine;
- 6. Explain the definition of pay limits: a. Understand how costs influence pay limits; b. Indicate what miners can do to control costs.
- 7. Explain mine call factor: a. Indicate what influence the miner has on mine call factor (Stoping width, on reef/ off reef, clean mining, water control, correct tipping, ore dilution, correct fragmentation)
- 8. Describe the mining method used on the mine

Learning Activity Guidelines:

- 1. Management of water in the workplace: a. Overall view of water in mines (reticulation and managing the natural flow of water); b. Different methods and techniques of managing water in working areas (keep water out of rock passes and pumping – legislative requirements.) c. Potential causes of flooding in mines and actions required to prevent these causes (Water/pilot board, cover drilling).

Total Credits: 8

Exemptions

Qualification or Learning programs that can give you exemption for this Module:

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Critical Knowledge Areas:

The areas of knowledge that must be fully understood to be deemed competent

1. Identification of rock strata conditions: a. How to identify Natural as well as induced discontinuities and anomalies; b. How to interpret the impact of the various discontinuities and anomalies.
2. Introduction to the control principles: a. Various actions to mitigate the impact on strata conditions and the work environment.
3. Types of different support and support methods: a. Difference between active and passive support; b. Difference between primary and secondary support; c. Description of the various support types. (Timber, hydraulic, mechanical and cementation.)
4. Application and installation of the various types of support: a. Timber support; b. hydraulic support; c. Mechanical support; d. Cementation support.
5. Introduction to geology: a. Terms and definitions used in mine geology (Stratification of ore deposits, reef, on reef, internal waste, external waste, channel width); b. Rocks associated with various mineral deposits.
6. Management of water in the workplace: a. Overall view of water in mines (reticulation and managing the natural flow of water); b. Different methods and techniques of managing water in working areas. c. Potential causes of flooding in mines and actions required to prevent these causes. d. responsibilities for managing water on mines.

399910031-KS-8: Engineering (3)

The focus of the learning in this subject is on building understanding of the basic engineering principles and concepts that will enable the learner to work with mechanical and electrical equipment and supervise basic construction work in underground hard rock mines.
1. (MUHR) Principles of maintenance, equipping and construction in mines (Basic) (Credits: 1)
Learning Activity Guidelines:

- 1. Describe the maintenance schedule for a miners section a. General rules of how a user of mechanical and electrical equipment can maintain the equipment. (Rolling stock, chain blocks, winches, etc.)
- 2. Legal requirements relating to working with electrical and mechanical equipment a. Need to do pre-use and post-use inspections; b. Who is authorised to do maintenance work; c. Protection and lock out procedures.
- 3. Principles and concepts of rigging, lifting and moving of material and equipment
- 4. Mine reticulation systems and column sizes, support practices and control valves.
- 5. Safety requirements of electrical installations and devices
- 6. Properties of concrete: a. What are the components of concrete; b. how does concrete react to different environmental conditions; c. The curing process; d. impact of corrosive materials on the strength of concrete.

2. (MUHR) Quantities of material, equipment and machinery required to execute all the mining activities (Intermediate) (Credits: 1)
Learning Activity Guidelines:

- 1. Calculations; a. Volume of rock to be moved/broken; b. Types of equipment required; c. Number of trips required; d. Time required to move the rock, e. Operating capacities; f. Basic trouble shooting guide.

3. (MUHR) The principles and concepts of the electrical operation of mining equipment (Basic) (Credits: 1)
Learning Activity Guidelines:

- 1. How electricity works
- 2. The dangers associated with electricity in an underground work environment
- 3. Checking the safety and operational efficiency of electrical equipment

Total Credits: 5

Exemptions
Qualification or Learning programs that can give you exemption for this Module:

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Critical Knowledge Areas:
The areas of knowledge that must be fully understood to be deemed competent

1. Legal requirements relating to working with electrical and mechanical equipment
   a. Need to do pre-use and post-use inspections;
   b. Who is authorised to do maintenance work;
   c. Protection and lock out procedures.
2. Operating principles:
   a. Hydraulics,
   b. Pneumatically operated components,
   c. Electrical components.
   d. Electronics
3. The dangers associated with electricity in an underground work environment
4. Properties of concrete:
   a. What are the components of concrete;
   b. how does concrete react to different environmental conditions;
   c. The curing process;
   d. impact of corrosive materials on the strength of concrete.

399910031-KS-9: Mining and Mineral Engineering (Underground Hardrock) (3)
The focus of the learning in this subject is on building understanding of the fundamental theory and concepts of mining in an underground hardrock mine. The learning includes the theories associated with the use of explosives and refers to the relevant legal requirements. The details of the acts will be dealt with separately. The subject covers the various mining methods and provides the underpinning knowledge that will be required to execute the work of a miner.

1. (MUHR) Mine logistics and management procedures relating to stores ordering and material procurement. (Intermediate) (Credits: 1)

Learning Activity Guidelines:

- 1. Describe the typical material transport systems on mines and the implications of this for ordering material on time (Stores, timber, explosives and long material)
- 2. Effect of poor logistics planning on safety and production:
   a. Potential lost time;
   b. Impact on labour productivity;
   c. Production and financial losses;
   d. The importance of making provision for critical replacement items.
- 3. Management of resources:
   a. Cost of consumables and the effects of wastage;
   b. Impact of wastage on the logistics;
   c. Impact of theft;
   d. Impact of over and under ordering;
   d. Implications of incorrect ordering of material on the cost opportunity of a budget.
- 4. Storage of consumables pertaining to a mining section:
   a. Shelf life of consumables (explosives and resins);
   b. Storage and stacking of materials and consumables;
   c. Hazards associated with stored materials;
   d. Principles of stock control.
2. (MUHR) Impact and implications of underground explosions and appropriate responses (Intermediate) (Credits: 3)
Learning Activity Guidelines:

- 1. Definition of an explosion: a. What is an explosion; b. Causes of explosions: lack of ventilation, poor application of ventilation appliances, accumulation of gas, blown out shot holes, faulty electrical equipment, substandard flame proofing, inadequate control and handling of explosives, contraband, inadequate dust suppression, poor face preparation.
- 4. Actions to deal with explosions: a. Safety precautions for controlled explosions (Follow blasting schedules); b. Preventative actions to avoid the causes of uncontrolled explosions; c. Emergency procedures for uncontrolled explosions.
- 5. Actions to prevent uncontrolled explosions: a. Drilling of pilot holes, cover drilling, continuous gas and ventilation monitoring and controlling, proper storage, transport and handling of explosives, adhering to face preparation procedures, control of contraband, proper maintenance and flame proofing, ensuring the competence of employees.

3. (MUHR) Features and characteristics and application of various types of explosives accessories and initiating systems. (Advanced) (Credits: 4)
Learning Activity Guidelines:

- 1. Definition of explosives and explosive accessories: a. Composition of explosives and accessories; b. Different divisions and classes of explosives. c. Types of explosives (emulsions, cartridge, ANFO, blasting gunpowder)
- 3. Application of explosives and accessories: a. Criteria to determine the suitability of explosives (ground conditions, environmental influences, type of mining operation (stoping, development, primary blasting, secondary blasting, impact of the explosives on the environment, cost).
- 4. Definition of initiation systems: a. Various types of system (Detonating cord and relay systems, capped fuse systems, shocktube, non electrical systems, electric system, electronic systems.) b. Generic Components of the systems (Manual interface, transfer or relay, detonating point)
- 5. Properties characteristics and components of each of the systems: a. Various types of system (Detonating cord and relay systems, capped fuse systems, shocktube, non
electrical systems, electric system, electronic systems.)

6. Application of the various systems: a. Where the systems are typically used; b. Standard installation and testing processes for a mine;

4. (MUHR) Concepts and principles associated with quality sequential blasting practices (Advanced) (Credits: 2)
Learning Activity Guidelines:

- 1. Definition and characteristics of a quality blast (How do we know a blast is a quality blast): a. Optimum face advance: b. Face shape and condition; c. Optimal fragmentation; d. Grades and directions; d. No damage to support and services.
- 2. Factors effecting the quality of a blast: a. Impact of face preparation (properly barred down and cleaned - solid face, misfires and sockets; b. Impact of marking and drilling (reference lines, burdens, spacing, direction, dip/elevation, depth, size of the hole, cleanliness (de-sludging of the hole) c. Impact of charging (Types of explosives, use of initiation systems, charging length, stemming/tamping length, various charging methods d. Impact of timing and sequencing the blast e. Free face creation.

6. (MUHR) Identification, treatment and removal of misfires (Advanced) (Credits: 1)
Learning Activity Guidelines:

- 1. What is a misfire: a. Legal definition of a misfire; b. How to identify a misfire; c. Causes of misfires; d. Hazards and dangers associated with misfires.
- 2. Process of dealing with misfires: a. Preparing to remove and deal with misfires (Key steps, associated risks, required protective equipment and why the PPE is important, Required tools and equipment that should be used in the destruction of old explosives); b. Precautions to be taken (Placement of guards, barricades and warning signs, Preventing the inadvertent entry of people into the area where misfires will be dealt with, testing for harmful gasses, watering down and the removal of combustible and flammable substances.)

7. (MUHR) Principles and practices for the storage and destruction of old explosives (Advanced) (Credits: 1)
Learning Activity Guidelines:

- 1. Definitions of old explosives and the need to remove and destroy them: a. What is defined as an old explosive; b. Reasons for effectively dealing with old explosives; c. Criteria for recognising old explosives.
- 2. Process of dealing with old explosives: a. Preparing to destroy old explosives (Key steps, associated risks, required protective equipment, required tools and equipment that should be used in the destruction of old explosives); b. Precautions to be taken (Placement of guards, barricades and warning signs, Preventing the inadvertent entry of
people into the area where old explosives will be destroyed, testing for harmful gasses, watering down and the removal of combustible and flammable substances.)

- 3. Key steps in destroying old explosives: a. Placing and securing of the old explosives; b. Connecting and timing the destructive blast; c. Potential risks and hazards; post destruction inspections; d. Legal requirements relating to the destruction of old explosives

9. (MUHR) Receive, handle, store, transport and control explosives and accessories (Intermediate) (Credits: 1)

Learning Activity Guidelines:

- 1. Describe the legal roles and responsibilities of all stakeholders regarding the handling, storage and transportation of explosives: a. Responsibilities of staff receiving explosives; b. Responsibilities of staff transporting explosives underground; c. Responsibilities of the Shift Supervisor regarding explosives and accessories; d. Responsibilities of the Miner, Team Leader and Blast Assistant regarding explosives and accessories,
- 2. Explain the conditions under which explosives and accessories must be stored giving examples of what could go wrong if these conditions are not adhered to: a. Regulated spacing between the storage units and the quantities allowed. b. Conditions to minimise deterioration of the efficacy of the products; c. Conditions relating to the need for separating incompatible products; d. Conditions that will minimise the risk of accidental explosions; e. Conditions that will limit access to the explosives to authorised people only; f. Conditions to ensure compliance with legisatory requirements.
- 3. Explain the process for handling, storing and transporting explosives and explosive accessories: a. Requirements regarding pre-inspections; b. Check the correct amount, type and condition of explosives received. c. Administrative requirements for controlling explosives and accessories.
- 4. Explain what preventative and contingency actions must be taken when handling, storing and transporting explosives: a. Actions to take when explosives are found abandoned or in unlocked explosive boxes; b. Actions to deal with contraventions of the legisatory requirements; c. Actions to be taken in an emergency situation whilst handling, storing or transporting explosives. (Fire, detection of dangerous gasses, road or rail accidents, injury to people, all other possible incidents) d. Actions to take when receiving excessive explosives or not all.

10. (MUHR) Blasting down hazardous ground and breaking big rocks by means of secondary blasting (Advanced) (Credits: 3)

Learning Activity Guidelines:

- 1. Explain what is meant by Hazardous ground and what significant risks and consequences associated with the workplace hazards pertaining to the removal of hazardous ground: a. How to identify hazardous ground; b. Conditions under which
hazardous ground must be blasted down; c. Alternative methods of dealing with hazardous ground. (Barring, supporting, blasting down)

- 2. Describe the procedure to be followed when blasting down hazardous ground; (Single shot firing)

- 3. Explain specified requirements regarding the blasting of big rocks; a. Significant risks and consequences associated with the workplace hazards by means of blasting. (Ground conditions, Support conditions, Flammable and noxious gases, Rocks that could possibly roll down inclined excavations, Fire, Exposure to unsafe Electrical connections, Working under unsafe roof or sidewalls.)

- 4. Describe the requirements pertaining to explosive products to be used for breaking large rocks. a. Types of explosives and accessories, b. Burning speed of fuses and igniter cord; c. Delay times for detonators; d. Sequence of timing.

- 5. Explain the standard procedures and processes that must be followed when preparing to break big rocks by means of blasting. a. Identify the required protective equipment and check that it is in good working order; b. Identify and check the operational efficiency of all required equipment; c. Describe the specific requirements for inspecting and preparing the area where the blasting is to take place.

11. (MUHR) Removal of obstructions in rock passes (Advanced) (Credits: 2)

Learning Activity Guidelines:

- 1. Explain the requirements pertaining to the removal of an obstruction from a rock pass by means of blasting: a. the significant risks and consequences associated with the workplace hazards pertaining to the removal of an obstruction from a rock pass by means of blasting; (Unsafe ground conditions, flammable and noxious gasses, inundation by water or rock material, exposure to unsafe electrical connections, working under unsafe hanging and sidewalls.) b. The significant risks and consequences associated with the work related hazards pertaining to the removal of an obstruction from a rock pass by means of blasting (Working at heights, Working in confined spaces, working in the proximity of rolling stock); c. The requirements regarding the action to be taken should the charge misfire or fail to explode within the specified time limit; d. The requirements related to product specifications in terms of usage of the explosives and accessories (Types of explosives and accessories, burning speeds of fuse and igniter cord, delay times of detonators, sequence of timing)

- 2. Describe the process for preparing to remove an obstruction from an ore pass: a. Appropriate tools, equipment and material; c. Examination and preparation of the area where the obstruction must be removed, (condition of the rock pass, unsafe ground conditions, flammable and noxious gasses, loose rocks, electrical connections, unsafe roof and sidewalls, protruding steel or other sharp edged objects, potential for inundation).d. Selection of the types and quantities of explosives and accessories to deal with the specific situations; e. Obtaining permission to blast (Responsible person, documentation, communication and time to blast.) f. Precautions to be taken to prevent injuries, gassing, explosions and fires. (no person to enter the rock pass from below the obstruction, placements of guards and warning signs, warning of persons, testing for harmful gases, watering down and removal of combustible and flammable substances, placement of hopper and loco) g. Requirements pertaining to the preparation of the
charge.

3. Describe the consequences to safety, occupational health and production, if requirements are not adhered to whilst preparing to remove an obstruction from a rock pass.

4. Describe the requirement for placing and initiating a charge to blast down an obstruction in an ore pass: a. Alternative methods of positioning and securing the charge; b. Final checks and safety requirements before initiating the charge; c. Actions to prevent damage to people and equipment; d. Communication requirements; e. Safe positions from which to initiate the charge; f. Post blasting activities.

Total Credits: 33

Exemptions

Qualification or Learning programs that can give you exemption for this Module:

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<th>Number</th>
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<th>Institution</th>
<th>NQF Level</th>
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</table>

Critical Knowledge Areas:
The areas of knowledge that must be fully understood to be deemed competent

3. Definition of an explosion: a. What is an explosion; b. Causes of explosions (lack of ventilation (Poor application of ventilation appliances), accumulation of gas and dust, blown out shot holes, faulty electrical equipment, substandard flame proofing, inadequate control and handling of explosives, contraband, inadequate dust suppression). poor face preparation) (NQF Level: 3)
5. Actions to deal with explosions: a. Safety precautions for controlled explosions; b. Preventative actions to avoid the causes of uncontrolled explosions; c. Contingency actions to deal with the consequences of uncontrolled explosions. (NQF Level: 4)
6. Actions to prevent uncontrolled explosions: a. Drilling of pilot holes, cover drilling, continuous gas and ventilation monitoring and controlling, proper storage, transport and handling of explosives, application of dust allaying principles, adhering to face preparation procedures, control of contraband, proper maintenance and flame proofing, ensuring the competence of employees) (NQF Level: 3)
7. Properties characteristics and components of each of the systems: a. Various types of system (Detonating cord and relay systems, capped fuse systems, shocktube non electrical systems, electric system, electronic systems.)
8. Application of the various systems: a. Where the systems are typically used; b. Standard
installation and testing processes; c. Advantages and potential disadvantages of each of the types of systems.

9. Factors effecting the quality of a blast: a. Impact of face preparation (properly barred down and cleaned - solid face, misfires and sockets; b. Impact of marking and drilling (burdens, spacing, direction, dip/elevation, depth, size of the hole, cleanliness (de-slungging) of the hole) c. Impact of charging (Types of explosives, use of initiation systems, charging length, stemming/tamping length, various charging methods d. Impact of timing and sequencing the blast e. Free face creation.

10. Application of explosives and accessories; a. Criteria to determine the suitability of explosives (ground conditions, environmental influences, type of mining operation (stopping, development, primary blasting, secondary blasting, impact of the explosives on the environment, cost).

11. Process of dealing with misfires: a. Preparing to remove and deal with misfires (Key steps, associated risks, required protective equipment and why the PPE is important, Required tools and equipment that should be used in the destruction of old explosives); b. Precautions to be taken (Placement of guards, barricades and warning signs, Preventing the inadvertent entry of people into the area where misfires will be dealt with, testing for harmful gasses, watering down and the removal of combustible and flammable substances.)

12. Key steps in destroying old explosives: a. Placing and securing of the old explosives; b. Connecting and timing the destructive blast; c. Potential risks and hazards; post destruction inspections; d. Administrative procedures and reporting requirements.

13. Explain the basic considerations for the selection of a mining method when a mine is being planned: a. Depth of the ore; b. Grade of the ore and the relationship with the cost per ton; c. Environmental considerations; d. Strata conditions; e. Availability of skilled labour; f. Availability of technology.

14. Explain the process for handling, storing and transporting explosives and explosive accessories: a. Requirements regarding pre-inspections; b. Description of the indicators that there is something wrong with the explosives and accessories; c. Identification of the PPE, tools and equipment that will be required for handling, storage and transportation of explosives; d. Administrative requirements for controlling explosives and accessories.

15. Describe the legal roles and responsibilities of all stakeholders regarding the handling, storage and transportation of explosives: a. Responsibilities of the supplier; b. Responsibilities of staff receiving explosives; c. Responsibilities of staff transporting explosives underground; d. Responsibilities of the Mine Overseer regarding explosives and accessories; e. Responsibilities of the Shift Supervisor regarding explosives and accessories; Responsibilities of the Miner, Team Leader and Blast Assistant regarding explosives and accessories.

16. Explain what is meant by Hazardous ground and what significant risks and consequences associated with the workplace hazards pertaining to the removal of hazardous ground: a. How to identify hazardous ground; b. Conditions under which hazardous ground must be blasted down; c. Alternative methods of dealing with hazardous ground.

17. Explain specified requirements regarding the breaking of big rocks by means of blasting a. Significant risks and consequences associated with the workplace hazards pertaining to the breaking of big rocks by means of blasting, is according to specified requirements. (Ground conditions, Support conditions, Flammable and noxious gases, Rocks that could possibly roll down inclined excavations, Fire, Exposure to unsafe Electrical connections,
Working under unsafe roof or sidewalls.)

18. Explain specified requirements pertaining to the removal of an obstruction from an ore pass by means of blasting:
   a. the significant risks and consequences associated with the workplace hazards pertaining to the removal of an obstruction from an ore pass by means of blasting; (Unsafe ground conditions, flammable and noxious gasses, Rocks that could roll down inclined excavations, fire, exposure to unsafe electrical connections, working under unsafe hanging and sidewalls, falling.)
   b. The significant risks and consequences associated with the work related hazards pertaining to the removal of an obstruction from an ore pass by means of blasting (Working at heights, Working in confined spaces, working in the proximity of rolling stock);
   c. The specified requirements regarding the action to be taken should the charge misfire or fail to explode within the specified time limit;
   d. The specified requirements related to product specifications in terms of usage of the explosives and accessories (Types of explosives and accessories, burning speeds of fuse and igniter cord, delay times of detonators, sequence of timing).

399910031-KS-10: Occupational Health and Industrial Hygiene (3)

The focus of the learning in this module is on building understanding of the key concepts and principles associated with the management of Occupational Health in an underground Hardrock Mine. The Learning includes reference to the relevant legal requirements.

1. (MUHR) Principles of hazard identification and continuous risk assessment (Intermediate) (Credits: 1)

   Learning Activity Guidelines:

   - 3. Purpose, structure and application of current MHSA: a. Objectives of the MHSA b. Requirements relating to owners, employers and employees with regard to inspectors; c. Requirements relating to answering questions asked by the inspector d. the four rights with regard to the safety and health granted to the employee’s; e. The appointment procedures of a safety representative f. Status of codes of practice g. Explanation of the legal terms and definitions

2. (MUHR) Origin, properties, effects, occurrence, limits and treatment of harmful
gasses (Intermediate) (Credits: 2)

Learning Activity Guidelines:

- 1. Types of gases found in mines: a. What are the different gases b. Hazards and risks associated with the different types of gases
- 2. Importance of testing for basic gases a. Preparation required b. Testing and monitoring instruments and the selection of the correct instrument
- 3. Dealing with hazardous gases: a. Typical actions to take in dealing with hazardous gases, reporting
- 4. Operating and calibration principles for the critical range of testing instruments

3. (MUHR) Concepts and preventative measures and treatment with regard to heat related symptoms and workplace conditions. (Advanced) (Credits: 1)

Learning Activity Guidelines:

- 1. Explain what heat exhaustion and heat stroke is: a. Difference between heat exhaustion and heatstroke; b. Symptoms of heat related illnesses/conditions; c. Causes of heat related conditions; d. Consequences of not acting correctly to deal with these conditions.
- 2. Describe what actions must be taken to prevent heat related conditions: a. Regular monitoring of the workplace temperatures; b. Permissible limits of temperatures; c. Observation of employees for the presence of symptoms.
- 3. Explain the actions to be taken when conditions could cause heat related symptoms in employees.
- 4. Explain the actions to be taken to treat employees who have symptoms of heat exhaustion and heat stroke.

4. Basic first aid (Credits: 2) (LEVEL 2)

Learning Activity Guidelines:

- 1. Describe what is meant by basic first aid: a. different levels of treatment b. requirements for dealing with trauma upon first arrival c. legal and ethical considerations in practicing first aid
- 2. Explain the different types of injuries: a. types of wounds and how they affect the body (head wounds, wounds to limbs and wounds to the body itself) b. dealing with fractures c. Controlling bleeding (pressure points)
- 3. Explain the symptoms, causes and treatment of shock: a. definition of shock and how it affects people b. symptoms of shock c. treatment of shock
- 4. Describe how to handle emergency situations: a. heart attacks and cardiac arrest b. conditions affecting breathing c. burns d. unconsciousness e. drowning f. exposure to poisons and toxins g. electric shock h. resuscitation techniques

5. Concepts and principles of accident/incident reporting and investigations (Credits: 1)
Learning Activity Guidelines:

- 1. Explain the definition of accidents and incidents: a. legal description of an accident b. relationship between incidents and accidents c. key indicators of deteriorating conditions that will lead to accidents.
- 2. Describe the legal requirements and processes for reporting and investigating accidents and incidents: a. classifications of accidents and incidents b. requirements and implications of reporting accidents and incidents c. consequences of not reporting all accidents and incidents

6. Concepts and principles of environmental control in an underground hardrock mine (Credits: 2)

Learning Activity Guidelines:

- 1. Explain the ventilation requirements for an underground hard rock mining operation a. Purpose and use of the main fan b. Reasons for ventilation c. Required quality for mine air d. Definition and requirements for a ventilation district (code of practice for ventilation, most important items to be addressed as far as ventilation is concerned, air measurements, failures to comply to codes of practice and implementation and maintenance of the code of practice); e. Management of dust.
- 2. Describe the positioning and utilisation of ventilation appliances: a. section fans b. regulation regarding other appliances (brattices, doors, regulators, and ventilation curtains)
- 3. Use section and mine plans and layouts to describe the key elements of ventilation plans: a. conventional ventilation signs for underground plans b. positioning and use of double doors and regulators; c. Impact on ventilation methods and districts.
- 4. Describe ventilation practices to control dust: a. air distribution/splitting; b. methods of measuring velocity of air by using a stop watch, tape and dust simulation (Chalk Dust, Aluminum dust etc) c. determining the percentage of air utilisation d. factors influencing utilisation of air (leakage through permanent stopping’s, conditions of fan ducting, leakage through temporary stopping’s, number of open through roads) e. auxiliary ventilation to working faces f. starting or restarting of section electric fans; f. Allowable limits

7. Concepts and practices of examining, making and declaring workplaces safe (Credits: 2)
Learning Activity Guidelines:

- 1. Explain waiting place and statutory examination procedures: a. Definition and responsibilities of competent persons (Miner and Comp A person.) b. Purpose and legal requirements for waiting places underground c. Procedures at the waiting place (Start and end of shift) d. Typical waiting place layout; e. Responsibilities of the competent persons at the waiting place;
- 2. Describe the purpose, responsibilities and processes to conduct statutory examinations a. Initial examinations and declaring the workplace safe; b. Procedures when working places have been idle (Idle for more than the prescribed time); c. Inspections during the shift (normal conditions, pillar extraction, testing for gas, misfires and sockets, stoppages of ventilation d. Exemptions (initial examination by competent person, changeover at face in multi shift operations, inspections during the shift, re-entry into working places blasted during the shift and examination for misfires, holes and sockets;
- 3. Explain the need for and processes of examination of working areas from station to the working places:

8. Practices related to emergency preparedness (Credits: 1)
Learning Activity Guidelines:

- 1. Explain what is meant by Emergency Preparedness and what the role of the miner is regarding this: a. Assembly points b. Refuge bays c. Escape routes d. Use of self rescuers (Examinations, Abuse of self rescuers Limitations of self rescuers)e. Lamp room operations, f. Definition of emergency Strategy for dealing with emergencies; g. Control of people in the working area.

Total Credits: 12

Exemptions

Qualification or Learning programs that can give you exemption for this Module:

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Critical Knowledge Areas:
The areas of knowledge that must be fully understood to be deemed competent

2. Importance of testing for basic gases a. Preparation required b. Testing and monitoring instruments and the selection of the correct instrument
3. Dealing with hazardous gases: a. Typical actions to take in dealing with hazardous gases, reporting
4. Describe what actions must be taken to prevent heat related conditions: a. Regular monitoring of the workplace temperatures; b. Permissible limits of temperatures; c. Observation of employees for the presence of symptoms.

5. Describe how to handle emergency situations: a. heart attacks and cardiac arrest b. conditions affecting breathing c. burns d. unconsciousness e. drowning f. exposure to poisons and toxins g. electric shock h. resuscitation techniques

6. Describe the legal requirements and processes for reporting and investigating accidents and incidents: a. classifications of accidents and incidents b. requirements and implications of reporting accidents and incidents c. consequences of not reporting all accidents and incidents

7. Describe ventilation practices to control dust: a. air coursing/splitting b. methods of measuring velocity of air by using a stop watch, tape and smoke tube c. determining the percentage of air utilisation d. factors influencing utilisation of air (leakage through permanent stopping’s, conditions of lime brattices and fan ducting, leakage through temporary stopping’s, number of open through roads) e. auxiliary ventilation to working faces (scoop and lime brattices) f. starting or restarting of section electric fans

8. Describe the purpose, responsibilities and processes to conduct statutory examinations a. Initial examinations b. Procedures when working places are idle for more than 6 hours c. Inspections during the shift (normal conditions, pillar extraction, testing for gas, misfires and sockets, stoppages of ventilation d. Exemptions (initial examination by competent person, changeover at face in multi shift operations, inspections during the shift, re-entry into working places blasted during the shift and examination for misfires, holes and sockets)

9. Explain what is meant by Emergency Preparedness and what the role of the miner is regarding this: a. Assembly points b. Refuge bays c. Escape routes d. Use of self rescuers (Examinations, Abuse of self rescuers Limitations of self rescuers) e. Lamp room operations Def of emergency Strategy for dealing with emergencies; f. PPE (Use, care and limitations)


The focus of the learning in this subject is on building understanding of the key terms and requirements of the Mine Health and Safety act and the Explosives Act. The learning requires learners to interpret the specific parts of the legislation and apply it in practical scenarios.

1. (MUHR) The definitions of safety related terminology as specified in the Mine Health and Safety Act, Regulations and Minerals Act and Regulations. (Intermediate) (Credits:
3) Learning Activity Guidelines:

- 2. Explain all the terms related to the work of a miner: a. Appointments and administration; b. Use of equipment, machinery and electricity; c. Handling of Explosives; d. Preventing and dealing with fires and explosions; e. Working with safety representatives and committees; f. Emergency preparedness; g. Surveying, Mapping and Mine Plans.
- 3. Interpret and apply the relevant parts of the Mine Health and Safety Act and regulations related to Falls of Ground prevention and declaring working places safe.
- 4. Describe and interpret the Mine Health and Safety Act and regulations relating to handling explosives (Regulations chapter 4): a. Definition of explosives b. Definition of initiation and initiation systems; c. Definitions of all related terms (misfire, misfired hole, primary blasting, secondary blasting, shot hole, socket) d. Security in respect of explosives; e. Receipt, storage, issuing, transportation and destruction of explosives; f. Approved explosives at mines; g. Primary and Secondary blasting to be performed by competent persons; h. Responsibilities of Blasting Assistants; i. Certification of initiation Apparatus and Blasting Systems; j. General precautionary measures when blasting; k. Prevention of flammable gas explosions:
- 5. Explain the general legal definitions applicable to the work of a miner.

2. (MUHR) Relevant requirements in terms of the Explosives Act (Basic) (Credits: 2)

Learning Activity Guidelines:

- 1. Explain the purpose and structure of the Explosives Act: a. Why the act exists; b. The application of the act; Key definitions of terms as used in the act (Detonate, explosion, explosive, explosive magazine, initiation, unauthorized explosives)
- 2. Interpret and explain the relevant sections of the Explosives Act with specific reference to the consequences of contravention of the Act: a. Inspections, entry and search by the inspector; b. Destruction of explosives; c. Storing and transporting explosives; d. Prohibition on the use of explosives without a permit; e. Record Keeping; f. Presumption of possession of explosives; g. Offences, penalties and appeals.

Total Credits: 6

Exemptions

Qualification or Learning programs that can give you exemption for this Module:

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<th>NQF Level</th>
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Version 04- 21OCT2011
Critical Knowledge Areas:
The areas of knowledge that must be fully understood to be deemed competent

1. Describe and interpret the Mine health and Safety act and regulations relating to handling explosives (Regulations chapter 4): a. Definition of explosives b. Definition of initiation and initiation systems; c. Definitions of all related terms (misfire, misfired hole, primary blasting, secondary blasting, shot hole, socket) d. Security in respect of explosives; e. Receipt, storage, issuing, transportation and destruction of explosives; f. Approved explosives at mines; g. Primary and Secondary blasting to be performed by competent persons; h. Responsibilities of Blasting Assistants; i. Certification of initiation Apparatus and Blasting Systems; j. General precautionary measures when blasting; k. Prevention of flammable gas and coal dust explosions; l. Shot Holes to be Stemmed.

2. Interpret and explain the relevant sections of the explosives act with specific reference to the consequences of contravention of the act: a. Inspections, entry and search by the inspector; b. Destruction of explosives; c. Storing and transporting explosives; d. Prohibition on the use of explosives without a permit; e. Record Keeping; f. Presumption of possession of explosives; g. Offences, penalties and appeals.
2.1.3.1 399910031- 1. Executing administrative duties related to the controlling and
<table>
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<tr>
<th>Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>PM-1</td>
<td>motivating of a mining production team to optimise the efficiency and productivity of the work team.</td>
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<tr>
<td>2.1.3.2 399910031-PM-2</td>
<td>3. Supervising and directing the activities of a mining crew to achieve a zero harm rate.</td>
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<tr>
<td>2.1.3.3 399910031-PM-3</td>
<td>4. Controlling the resources allocated to mine a section in an underground hard rock mine to reduce wastage.</td>
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<td>2.1.3.4 399910031-PM-5</td>
<td>6. Supervising and executing technical tasks to conduct primary blasting in underground Hard Rock Mines.</td>
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<tr>
<td>2.1.3.5 399910031-PM-6</td>
<td>7. Supervising and executing technical tasks to conduct secondary blasting in underground Hard Rock Mines.</td>
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<tr>
<td>2.1.3.6 399910031-PM-7</td>
<td>8. Execute technical tasks and Supervise the cleaning of blasted rock from underground working areas.</td>
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<tr>
<td>2.1.3.7 399910031-PM-8</td>
<td>9. Supervising the execution of tasks to supply services to Stoping and Development operations in an Underground Hard Rock Mine.</td>
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**399910031-PM-1: 1. Executing administrative duties related to the controlling and motivating of a mining production team to optimise the efficiency and productivity of the work team. (NQF Level:3)**

**Scope of the Module**

The focus of the learning in this module is on providing learners an opportunity to practice the technical and communication skills required to execute the various administrative duties of the miner. The learning includes related problem solving and applied mathematical skills.

**1. (MUHR) Clearly communicate using a telephone and/or two way radio (Credits: 1) (GO TO TEAM LEADER)**

**Learning Activity Guidelines:**

*Given a range of workplace situations and instructions and a diverse group of stakeholders as well as a telephone and/or two way radios. Be able to:*

1. Operate the telephone/two way radio according to the guiding principles of effective telephone/radio etiquette.
2. Communicate all relevant information regarding a situation clearly and accurately.
3. Test understanding that the information has been understood.
4. Ask questions and collect additional required information.
5. Communicate instructions and check understanding of the instructions.
6. Set and agree follow up communications to check progress or collect additional information.
7. Record the results of the communication.

**Guidelines for assessment:**

1. **APPLIED KNOWLEDGE:** Test understanding of the communication model and the key principles of effective communication as well as the specific barriers and challenges that people experience when communicating via telephone and two way radio.
2. Observe the use of the processes for effective communication.
3. Observe the use of clear language and questioning techniques.
4. Evaluate the accuracy and relevance of the record of the communication. (Will a third party
understand and be able to use the recorded information)

2. (MUHR) Conduct motivational discussions with work teams (Credits: 2)

Learning Activity Guidelines:
Given specific positive and negative workplace scenarios and a diverse group of employees. Be able to:
1. Prepare a motivational communication to the workers to thank people for good performance and motivate additional effort to improve poor performance.
2. Conduct a motivational discussion, deal with difficult questions and concerns and agree actions to improve performance.
3. Capture the results of the discussion and identify follow up actions.
4. Effectively execute management briefs
5. Give proper job instruction

Guidelines for assessment:
1. APPLIED KNOWLEDGE: Test understanding of the principles of employee motivation, the roles of different stakeholders and the techniques to make small group presentations. (Stakeholders include management, supervision, organised labour, human resources, all service departments, health and safety representatives and employees)
2. Observe the use of effective small group presentation skills and the techniques for responding to questions and dealing with potential inter group conflict.
3. Evaluate the accuracy, relevance and practical feasibility of the agreed action plans.

3. (MUHR) Execute all start and end of shift procedures (Credits: 2)

Learning Activity Guidelines:
Given a simulated mining workplace and a mining team. Be able to:
1. Execute all start of shift procedures
2. Execute all end of shift procedures

Guidelines for assessment:
1. APPLIED KNOWLEDGE: Test understanding of the legislative requirements regarding statutory examinations and record keeping.
2. Observe that all processes, procedures and protocols required for start and end of shift procedures are followed and adhered to.

4. (MUHR) Execute basic calculations required for reporting and ordering (Credits: 2)
Learning Activity Guidelines:
*Given scenarios of the operating conditions for a range of typical mining workplaces, production plans for stoping, development and construction, equipment, material price lists and typical mining bonus scenes.* Be able to:
1. Calculate the quantity of consumables required to mine the sections during the next month according to the plan.
2. Calculate face advance and advance per blast
3. Calculate tones broken and tons transported
4. Calculate an estimated R/ton cost
5. Calculate estimated bonus earnings for the team
6. Calculate the explosive consumption for blasting specific tonnages

Guidelines for assessment:
1. Evaluate the accuracy of the calculations.
2. **APPLIED KNOWLEDGE:** Test understanding of the basic mathematical theory required to do the calculations.

5. *(MUHR)* Handle withdrawals from dangerous workplaces *(Credits: 1)*

Learning Activity Guidelines:
*Given scenarios of a full range of dangerous situations, a simulated/control workplace and a full work team with additional service department staff.* Be able to:
1. Identify the dangers associated with the scenarios
2. Give instructions to withdraw people from the workplaces
3. Conduct the required safety procedures, examinations and demarcations, before, during and after the withdrawals
4. Report and complete required documentation
5. Deal with difficult, panicking and objecting people

Guidelines for assessment:
1. **APPLIED KNOWLEDGE:** Test understanding of the relevant legal requirements relating to dangerous situations and the withdrawal of workers.
2. Observe the use of the appropriate processes to withdraw people
3. Observe the use of effective interpersonal behaviours and skills to deal with difficult people.
4. Evaluate the accuracy, completeness and legal compliance of the procedures, reports and documentation.

6. *(MUHR)* Identify the root cause of problems in sections and recommend appropriate corrective actions. *(Credits: 1)*

Learning Activity Guidelines:
*Given scenarios relating to a full range of typical workplace problems and a diverse group of
employees with information relating to these situations. **Be able to:**
1. Identify and define the problem/opportunity
2. Categorise the problems as (Technical problems, people problems, decisions that must be made and plans that must be implemented)
3. Use logical processes to analyse problems from each of the categories
4. Define the root causes of the various problems
5. Generate suitable alternative solutions to deal with the causes of the problems.
6. Identify the risks associated with the solutions
7. Develop action plans to implement agreed solutions.

**Guidelines for assessment:**
1. **APPLIED KNOWLEDGE:** Test understanding of the basic principles and concepts of problem solving and decision making.
2. Observe the use of appropriate process steps and questions to define, categorise and analyse the various problems.
3. Evaluate the correctness, practicality and feasibility of the recommended solutions to the various problems.
4. Evaluate the extent to which the implementation action plan considers and deals with the associated hazards and risks.

7. **(MUHR) Read, interpret and complete all required forms and reports. Complete planned task observations and investigation documents to the required quality standard. (Credits: 2)**

Learning Activity Guidelines:
Given a full set of documents, forms, records and reports relating to a mining production section and scenarios relating to the performance of the section. Be able to:

1. Identify the forms and reports that must be completed
2. Read and interpret the various reports and performance information.
3. Complete all the required reports and forms.
4. Evaluate the accuracy, completeness and readability of the completed documentation.

Guidelines for assessment:
1. APPLIED KNOWLEDGE: Test understanding of the purpose of all the reports and forms and the consequences of inaccurate and incomplete record keeping.
2. Evaluate the accuracy of the interpretation of the reports.

8. (MUHR) Read, interpret and update a mine plan. (Credits: 3)

Learning Activity Guidelines:
Given a completed mine plan, and a plan of specific workings (stope sheet as well as production plans and results and relevant services department reports for a work area. Be able to:

1. Measure an underground workplace
2. Plot and update the section plan with the production information
3. Calculate volumes, tonnes, and face advance (distances) using the mine plan.
4. Interpret the plan and describe the implications of the conditions on the mine plan related to the specific working area in terms of safety and production;

Guidelines for assessment:
1. APPLIED KNOWLEDGE: Test understanding of the concepts and principles of mine survey. (a. Definition and purpose of the different types of mine plans (1:1000. 1:200 1:500), b. Legal requirements covered on the various mine plans (including survey notes, holing notes, start up notes. c. Plan layout and relevant symbols and signage used on mine plans d. Implication of non adherence to requirements on mine plans
2. Evaluate that all features and orientations on the plan is correctly identified and described.
3. Evaluate the accuracy of the interpretation and that all implications related to safety and production have been identified and correctly described.
4. Evaluate that all calculations are correctly done.
5. Observe the process of plotting and updating the plan checking accuracy, neatness and completeness.

Total Credits: 16
Provider Accreditation Requirements:
Human Resources
The facilitators of learning for this module must be in possession of at least a NQF level 4 qualifications with mathematics and English communication and a valid Blasting certificate. The facilitators must have a proven track record in facilitating learning in the areas of communication and problem solving.

Physical Resources
In order to facilitate the learning for this module the provider must have adequate access to simulated and/or controlled underground mining environments that meet the minimum standards of safe and appropriate workplaces.

Safety, Health and Environment
Providers must comply with the relevant requirements of the Mine Health and Safety act.

399910031-PM-2: 3. Supervising and directing the activities of a mining crew to achieve a zero harm rate. (NQF Level:3)

Scope of the Module
The focus of the learning in this module is on providing learners an opportunity to practice the use of technical and interpersonal skills to supervise the achievement of zero harm in an underground mining work environment. The learning includes the inspection and making safe of workplaces, gas testing and a range of related interpersonal skills.

1. (MUHR) Conduct inspections of underground working areas, report findings and initiate appropriate corrective action. (Credits: 4)

Learning Activity Guidelines:
Given controlled underground working areas in a Hardrock mine. Be able to:

1. Conduct examination of the workplaces (Entry examinations, and re-
2. Inspect all production equipment and machinery;
   2. Identify situations that require immediate action
   3. Give instructions to correct the critical issues
   4. Record all sub standard conditions in the workplaces
   5. Identify and plan actions to correct all issues in the workplaces
   6. Evaluate various underground working places and determine if the places are safe to work in.
   7. Take and evaluate occupational hygiene measurements of (Velocity and temperatures) and take relevant action.

Guidelines for assessment:
1. APPLIED KNOWLEDGE: Test understanding of the legal requirements and site specific standards in regards of all aspects of the underground work places. (Ventilation and dust, temperature, machinery and equipment, ground conditions, electrical installations, traveling ways and escape routes, environmental conditions, hygiene conditions, store areas, refueling bays, lighting, explosive storage)
2. Observe the use of PPE, safety equipment and tools
3. Observe that the correct sequence of examinations and processes are used.
4. Evaluate the final report with regard to completeness, accuracy and the practicality of corrective actions.

2. (MUHR) Conduct on job training/coaching of team members.
   (Credits: 1)

Learning Activity Guidelines:
Specific tasks and a group of diverse people. Be able to:
1. Break the tasks down into digestible chunks that can be taught easily. (Coaching guide)
2. Conduct risk assessments in an underground working place and then demonstrate the tasks to the employees explaining each step in the task.
3. Check that employees understand the task
4. Allow employees to practice the task and correct where required.
5. Observe whilst employees execute the task safely. (Task observation)
6. Provide feedback and set further learning processes in place.

Guidelines for assessment:
1. APPLIED KNOWLEDGE: Test understanding of the principles and processes of coaching individual team members.
2. Observe the process that is used to involve the learner, set them at ease and explain the big picture.
3. Evaluate the correctness and completeness of the coaching guide.
4. Observe the use of appropriate interpersonal behaviours to demonstrate the task.
5. Observe the use of appropriate questions and techniques to ensure that the skill is properly transferred.
6. Evaluate the extent to which the employees being coached have mastered the skills and the underpinning knowledge.

3. (MUHR) Conduct safety meetings and present safety information
at team based safety meetings. (Credits: 1)

Learning Activity Guidelines:
Given scenarios relating to the Occupational Health and Safety situations of a working area, various reports from services departments and a team of employees. Be able to:

1. Prepare an agenda for a safety meeting
2. Conduct a safety meeting
3. Deal with questions and concerns
4. Record and report critical issues (Supervisor)

Guidelines for assessment:
1. APPLIED KNOWLEDGE: Test understanding of the legal requirement regarding safety meetings and committees as well as the roles and responsibilities of Occupational safety and Health representatives.
2. Evaluate the appropriateness, completeness and functionality of the proposed agenda.
3. Observe the use of an appropriate meeting procedure, sequence and process.
4. Observe the use of appropriate interpersonal behaviours to chair the meeting, deal with questions and manage time.
5. Evaluate the accuracy and completeness of the record of the meeting where applicable.

4. (MUHR) Counsel employees and correct sub standard performance and give verbal warnings where required. (Credits: 2)

Learning Activity Guidelines:
Given scenarios relating to the performance of team members, production results for a work section, scenario relating to a specific mining operation and a group of diverse team members. Be able to:

1. Discuss the performance of team members with then and identify the possible causes for poor/sub-standard performance.
2. Agree corrective actions and set up corrective action plans.
3. Refer employees for outside/specialist help and training if required.
4. Issue verbal and written warnings where required.
5. Initiate and participate in formal disciplinary action

Guidelines for assessment:
1. APPLIED KNOWLEDGE: Test understanding of the legal and procedural requirements relating to employee performance management.
2. Observe the process used to counsel employees and the effective use of appropriate interpersonal behaviors to deal with objections.
3. Evaluate the correctness, practicality and feasibility of the agreed corrective action plan.

5. (MUHR) Identify the potential sources of conflict in a work team and take action to prevent and resolve conflict. (Credits: 2)

Learning Activity Guidelines:
Given scenarios regarding interpersonal and inter group conflict in the workplace and a diverse group of people. Be able to:
1. Identify potential sources of conflict.
2. Involve the correct stakeholders to deal with the potential conflict and prevent it from occurring.
3. Discuss conflict situations with team members and try to resolve it.
4. Initiate actions to deal with existing and potential conflict.

Guidelines for assessment:
1. **APPLIED KNOWLEDGE:** Test understanding of the principles and concepts of conflict resolution as well as the legal requirements regarding the management of conflict in the workplace.
2. Observe the process and interpersonal behaviours used to deal with existing conflict.
3. Evaluate the appropriateness of the actions initiated to prevent and deal with conflict.

6. **(MUHR) Test for various types of harmful gasses and take appropriate action. (Credits: 2)**

**Learning Activity Guidelines:**
Given a production area and required gas testing equipment, be able to

1. Execute legally required lamp room procedures: a. select correct instruments to test for carbon monoxide and methane gas b. examine and test instruments to ensure that they are operational c. complete lamp room documentation at start and end of shift
2. Test for gas in a workplace: a. demonstrates how to test for flammable and noxious gases and describe procedures, findings and actions; b. Consider routes to be taken; c. Indicate when and where to do additional tests;
3. Explain the miner’s responsibilities when flammable and noxious gas is detected a. Withdraw workers from affected and surrounding workplaces b. Warn people on the return air side; c. Place guards and/or barricade areas’ d. Notify the supervisor.

Guidelines for assessment:
1. **APPLIED KNOWLEDGE:** Test understanding of all the legal requirements regarding gas testing
2. Test understanding of the types of gases found in an underground mine and their associated dangers.
3. Observe the extent to which correct processes and legal procedures are executed when testing for gas.

**Total Credits: 18**

**Provider Accreditation Requirements:**

**Human Resources**
An accredited provider must make use of facilitators of learning that holds at least a NQF level 5 qualifications in Mining, a Blasting Certificate and a proven track record in the facilitation of learning in communication skills.

**Physical Resources**
The accredited provider must have access to controlled and actual underground mining work environments.

**Safety, Health and Environment**
The provider must be in compliance with all Mine Health and Safety and Labour Law requirements.

399910031-PM-3: 4. Controlling the resources allocated to mine a section in an underground hard rock mine to reduce wastage. (NQF Level:3)

**Scope of the Module**
The focus of the learning in this module is on providing learners an opportunity to practice the skills required to identify and combat wastage in an underground mining section. The learning contains specific aspects related to the calculation and management of labour efficiencies.

1. (MUHR) Identify wastage in a section and plan how it can be reduced. (Credits: 4)

**Learning Activity Guidelines:**
*Given* a working mining section, section plan, scenarios regarding the mining operations, service department reports and the past three months performance results of the section. **Be able to:**
1. Conduct an inspection of the section, and observe operations in the section for a period of one week and identify areas of wastage and potential improvements.
2. Develop an action plan to reduce the wastage and improve performance.
3. Work with team members to implement possible improvements.

**Guidelines for assessment:**
1. **APPLIED KNOWLEDGE:** Test understanding of the required quality standards for a mining section and the calculations required to determine the optimum resource requirements to meet specific production plans.
2. Evaluate the extent to which all possible improvements and savings have been identified.
3. Evaluate the feasibility of the improvement plan.
4. Evaluate the ability to assist with the implementation of improvements.

2. (MUHR) Plan to achieve given labour efficiencies for specific work areas (Credits: 4) INCLUDE IN THE PLANNING MODULE.

**Learning Activity Guidelines:**
*Given* a production plan for a section, the labour complement and the performance outputs as
well as a scenario regarding the mining operations and a background of the employees. Be able to:
1. Calculate the expected labour efficiencies to achieve the required production results.
2. Conduct a in-situ observation to collect data on labour efficiencies.
3. Calculate the current labour efficiencies.
4. Develop a plan to improve the labour efficiencies.

Guidelines for assessment:
1. APPLIED KNOWLEDGE: Test understanding of the basic principles of efficiency and efficiency measurement.
2. Evaluate the accuracy of the various efficiency calculations.
3. Evaluate the effectiveness and practicality of the efficiency improvement plans.

Total Credits: 12

Provider Accreditation Requirements:

Human Resources
Accredited providers must make use of facilitators of learning that holds at least a NQF level 5 qualification in Mining with a Blasting certificate and related planning and Human resources management exposure. Proven track record in facilitating learning in mathematics is required.

Physical Resources
Accredited providers must have access to controlled and actual underground mining work environments.

Safety, Health and Environment
Accredited providers must be in compliance with all Mine Health and Safety and Labour Law requirements.

399910031-PM-5: 6. Supervising and executing technical tasks to conduct primary blasting in underground Hard Rock Mines. (NQF Level:3)

Scope of the Module
The focus of the learning in this module is on providing the learner an opportunity to practice the skills required to conduct primary blasting in an underground hardrock mine. The skill will be practiced in a actual work section under the supervision of a qualified instructor. All activities to plan and execute the blasting cycle will be practiced and evaluated over a full production month.

1. (MUHR) Plan and execute the daily mining cycle (Development and Stoping). (Credits: 16)

Learning Activity Guidelines:
Given a controlled underground workplace with all the required tools, equipment and labour. Be able to:
1. Read survey notes and service department instructions and apply the instructions in an
underground workplace. (All instructions are correctly interpreted and applied)
2. Conduct a review meeting with a team indicating daily actions to improve performance
   (Meeting procedures are complied with, visual management scoreboard updated and all
   instructions issued and delegated according to prescribed standard)
3. Inspect and analyse a blasted face and recommend improvements to blasting practices.
   (Roof, hanging and foot-wall conditions checked, sockets evaluated, fragmentation and
   through evaluated, face shape and face advance checked)
4. Prepare, take lines/grades and mark different types of faces (stoping and development).
   (All safety procedures followed, correct burden, drilling pattern, spacing, direction and dip
   indicated)
5. Use monthly plan to set daily blasts for the workplace. (Sufficient provision for cleaning cycle
   (Cleaning shift preparations), correct daily advance per blast and monthly face advance
   calculated and planned)
6. Mark support pattern and supervise the installation of support
7. Examine drilled shot holes (All holes are at correct depth, direction and dip, holes are de-
   slugged and correct diameter.)
8. Supervise the preparation of primers and the charging up of shot holes (All legal
   requirements complied with)
9. Connect and time the blast (Will ensure proper free face creation and sequential blasting)
10. Initiate the blast

Guidelines for assessment:
1. APPLIED KNOWLEDGE: Test understanding of the concepts and principles of quality
   blasting practices and Safety and Health requirements related to blasting.
2. Observe the compliance with all Safety and Occupational Health requirements and
   standards.
3. Evaluate the achievement of planned advance per blast and face advance.

Total Credits: 16

Provider Accreditation Requirements:
Human Resources
Accredited providers must make use of facilitators of learning that holds at least a NQF level 5
qualification in Mining, a Blasting Certificate and a proven track record in the facilitation of
blasting practices in an underground hardrock mine.

Physical Resources
Accredited providers must have access to controlled and actual underground mining work
environments.

Safety, Health and Environment
Accredited providers must be in compliance with all Mine Health and Safety and Labour Law
requirements.

399910031-PM-6: 7.Supervising and executing technical tasks to conduct
secondary blasting in underground Hard Rock Mines. (NQF Level:3)
Scope of the Module

The focus of the learning in this module is on providing learners an opportunity to practice the skills required to conduct secondary blasting to break big rocks, clear obstacles in ore passes and deal with dangerous/hazardous overhanging ground/rocks. The skills will be practiced in a real working environment under the direct supervision, coaching and control of a qualified mining instructor.

1. (MUHR) Blast down hazardous ground. (Credits: 2)

Learning Activity Guidelines:

Given a simulated or controlled working environment where there is dangerous/hazardous overhanging ground conditions, all the required tools, equipment and labour. Be able to:

1. Obtain permission to blast, inspect the area and make it safe for work.
2. Plan how to blast down the dangerous ground and obtain all the required tools, equipment and material to bring down the dangerous ground.
3. Prepare the work area for the blasting process
4. Prepare the explosive charges and set the charges
5. Connect the charges to the initiation system and conduct pre-initiation checks
6. Initiate the blast and conduct post-blasting inspections and processes
7. Deal with and damage and consequences of the blast
8. Plan and supervise the removal of the blasted down rocks.

Guidelines for assessment:

1. APPLIED KNOWLEDGE: Test understanding of: a. The legal and procedural requirements relating to dealing with dangerous ground. b. The Safety and Health requirements relating to inspecting and declaring workplaces safe for work. c. The features, properties and utilisation of appropriate explosive devices to do this task.
2. Evaluate the safety, feasibility and practicality of the work plans
3. Evaluate the use of appropriate PPE, tools and equipment
4. Evaluate the quality of the end result and the actions taken to secure the workplace after removing the dangerous ground.

2. (MUHR) Break big rocks and remove support by means of secondary blasting. (Credits: 1)

Learning Activity Guidelines:

Given various big rocks in different locations in an underground working area, the required
tools, equipment and material as well as the needed labour. **Be able to:**

1. Obtain permission for blasting and inspect the area and make it safe for work.
2. Plan how to blast and obtain all the required tools, equipment and material.
3. Prepare the explosive charges and set the charges.
4. Connect the charges to the initiation system and conduct pre-initiation checks.
5. Initiate the blast and conduct post-blasting inspections and processes.
6. Deal with and damage and consequences of the blast.
7. Plan and supervise the removal of the blasted rocks/support

2. **Guidelines for assessment:**

   1. **APPLIED KNOWLEDGE:** Test understanding of: a. The hazards and safety requirements when breaking big rocks by means of blasting; b. The relevant legal and procedural requirements. c. The consequences of non-adherence to all procedures.
   2. Observe to execution of all procedures
   3. Evaluate the quality of the final result and the impact of the work on the environment, equipment and plant.

### 3. (MUHR) Remove obstructions in rock passes. (Credits: 2)

**Learning Activity Guidelines:**

*Given a simulated, actual or controlled production environment where there are obstructions in ore passes that must be blasted down, all the required tools and equipment as well as the needed labour. Be able to:*

1. Obtain permission, inspect the area and make it safe for work.
2. Plan how to blast down the obstruction and obtain all the required tools, equipment and material to bring down the obstruction.
3. Prepare the work area for the blasting process.
4. Prepare the explosive charges and set the charges.
5. Initiate the blast and conduct post-blasting inspections and processes.
6. Inspect, identify and deal with and damage and consequences of the blast and complete required report/communication.

**Guidelines for assessment:**

1. **APPLIED KNOWLEDGE:** Test understanding of: a. The safety and legal requirements for blasting down obstructions in ore passes; b. The hazards associated with working at heights; c. The hazards associated with working in confined spaces and under unsafe hanging and sidewalls.
2. Observe the correct use of procedures and safety standards.
3. Observe the correct priming, setting and initiation of the blast.
4. Evaluate the results of the operation.

Total Credits: 8

**Provider Accreditation Requirements:**

**Human Resources**

Accredited providers must make use of facilitators of learning that holds at least a NQF level 5 qualification in Mining, a Blasting Certificate and a proven track record in the facilitation of
blasting practices in an underground hardrock mine.

Physical Resources
Accredited providers must have access to controlled and actual underground mining work environments.

Safety, Health and Environment
Accredited providers must be in compliance with all Mine Health and Safety, Explosive and Labour Law requirements.

399910031-PM-7: 8. Execute technical tasks and Supervise the cleaning of blasted rock from underground working areas. (NQF Level:3)

Scope of the Module
The focus of the learning in this module is on providing the learners an opportunity to practice all the skills required to remove and transport broken rock in an underground mine. The skills will be practiced in a real production section under the direct coaching, supervision and control of a qualified mining instructor over a full production month.

1. (MUHR) Compile a work plan and schedule to clean underground workplaces and supervise the implementation of the plan. (Credits: 16) (Development and Stoping)

Learning Activity Guidelines:
Given a underground production section, all required tools, equipment and material as well as the required labour. Be able to:

3. Calculate the potential tonnage from planned working areas and the actual tonnage of blasted rock in order to execute the cleaning operation and identify actions to improve performance. Check that all the required equipment and material is available.
4. Conduct planning meeting with cleaning team
2. Conduct pre-use checks on machinery and equipment.
3.
4.
5. Supervise all cleaning activities
6. Deal with problems during a cleaning shift (Loss of air, loss of power, mechanical breakdowns)
7. Over inspect and ensure that all workplaces are safe to be worked in.

Guidelines for assessment:
1. APPLIED KNOWLEDGE: Test understanding of all Mine Health and Safety requirements relating to the removal and transportation of rock in an underground mine.
2. Test understanding of the requirements and procedures for inspecting and making work
places safe for work.
3. Observe the application of supervisory processes and procedures in dealing with all eventualities during a "cleaning shift"
4. Evaluate the quality of problem solving
5. Evaluate the achievement of the planned production targets.

Total Credits: 8

Provider Accreditation Requirements:

Human Resources
Accredited providers must make use of facilitators of learning that holds at least a NQF level 5 qualification in Mining, a Blasting Certificate and a proven track record in the facilitation of cleaning practices in an underground hardrock mine.

Physical Resources
Accredited providers must have access to controlled and actual underground mining work environments.

Safety, Health and Environment
Accredited providers must be in compliance with all Mine Health and Safety and Labour Law requirements.

399910031-PM-8: 9. Supervising the execution of tasks to supply services to Stoping and Development operations in an Underground Hard Rock Mine. (NQF Level:3)

Scope of the Module
The focus of the learning in this module is on providing learners an opportunity to practice the skills required to plan and supervise construction work for the supply of services to an underground mining production section. Learners will practice the skill in an actual work environment under the coaching control and supervision of a qualified mining instructor for a period of three weeks.

1. (MUHR) Identify, plan and supervise the construction and supply of services to a mining section. (Development and Stoping) (Credits:
8) Learning Activity Guidelines:

Given a operating production environment all required tools, equipment, machinery and labour. Be able to:

1. Inspect installation of services and identify and correct sub standard conditions.
2. Plan the material required to supply services to a mining section
3. Supervise the installation of pipes, tracks and ventilation systems (PTV)
4. Supervise the installation of straining wire
5. Supervise the construction of drains, winch beds, grizzlies and all related concrete work to supply services to a section.
6. Supervise the installation of winches (Scraper and mono)
7. Supervise the construction of ladders and travelling ways.
8. Supervise the installation of barricades

Guidelines for assessment:
1. APPLIED KNOWLEDGE: Test understanding of the basic engineering principles associated with pipe work, concrete work, torch cutting, mechanical operating principles of winches and pulleys and basic lifting and loading principles.
2. Observe the application of supervisory principles to deal with all the construction work.
3. Observe the use of problem solving ability to deal with delays, breakdowns and poor quality work.
4. Evaluate the planning of all the jobs (Basic engineering drawings must be interpreted and used)
5. Evaluate the quality and on time completion of the work.

Total Credits: 8

Provider Accreditation Requirements:

Human Resources
Accredited providers must make use of facilitators of learning that holds at least a NQF level 5 qualification in Mining, a Blasting Certificate and a proven track record in the facilitation of construction practices in an underground hardrock mine.

Physical Resources
Accredited providers must have access to controlled and actual underground mining work environments.

Safety, Health and Environment
Accredited providers must be in compliance with all Mine Health and Safety and Labour Law requirements.

Work Experience Modules

| 2.1.4.1 | 399910031-WM-1 | Team works effectively |
| 2.1.4.2 | 399910031-WM-3 | Minimum wastage |
2.1.4.3 399910031-WM-4  Prevention of working in a gas hazardous environment
2.1.4.4 399910031-WM-5  Faces blasted in virgin rock
2.1.4.5 399910031-WM-6  Rock blasted
2.1.4.6 399910031-WM-7  Blasted ore transported to tips and back areas
2.1.4.7 399910031-WM-8  Services available

399910031-WM-1: Team works effectively (NQF Level:3)

Purpose of the Module
The focus of the learning in this subject is on allowing learners to experience the work required to mobilise and manage work teams in a real work environment and under production conditions. This part of the work experience will be evaluated during the four month work experience period where the learner works as a miner in a production section.

1. (MUHR) Conduct Planned task observations and inspections (Credits: 3)
Scope of work activities:

- 1. Observe all tasks in the process for removing and transporting broken rock.
- 2. Observe all tasks in the process for inspecting and making work places safe.
- 3. Observe all tasks in the process for installing support
- 4. Observe all tasks in the process for preparing and charging up a blast face
- 5. Observe all tasks in the process for conducting secondary blasting
- 6. Conduct Risk assessments
- 7. Use notebook/logbook

2. (MUHR) Conduct team meetings (Credits: 2)
Scope of work activities:

- 1. Conduct and record the results of start and end of shift meetings
- 2. Conduct and record the results of safety meetings
- 3. Conduct and record the results of problem solving meetings
- 4. Handle management briefs
- 5. Giving proper job instructions
- 6. Initiate and deal with workplace stoppages
- 7. Solve bonus and related queries
- 8. Use of information from reports (Safety, environmental, survey and sampling.)
- 9. Plotting on the mine plan
- 10. Completion of safety meeting reports

3. (MUHR) Order, receive and store explosives and explosive accessories. (Credits: 1)
Scope of work activities:

- 1. Calculate requirements for explosives and accessories
- 2. Place orders and receive explosives
- 3. Store explosives and accessories
- 4. Issue explosives and accessories to blast assistant
- 5. Complete all registers and reports.

4. (MUHR) Over inspection of all pre use checklists (Credits: 1)

Scope of work activities:

- 1. Pre-use checks on mobile equipment
- 2. Pre-use checks on tools
- 3. Pre-use checks on stationary equipment

Total Credits: 8

Contextualised Workplace Knowledge Required

- Mine ordering and procuring procedures and standards.
- Mine policy and procedures regarding incentive schemes and the protocols for responding to queries and complaints.
- Mine rules and procedures regarding labour and access control.
- Mine specific discipline and grievance procedures
- Mine specific document control procedures
- Mine specific HR and Safety policies and procedures.
- Mine specific programmes and initiatives relating to Employee wellness

Guidelines for assessment:

1. Minutes of safety meetings kept according to standard, legible accurate and complete.
2. Task observation checklists completed with clear indication of corrective action taken.
3. Explosive register up to date, with an accurate reflection of the available and used explosives and explosive accessories.
4. All pre-use checklists completed and signed off by users.
5. Declarations completed accurately

Workplace Resources Required

Human Resources
### Physical Resources

#### Safety, Health and Environment

<table>
<thead>
<tr>
<th>399910031-WM-3: Minimum wastage (NQF Level:3)</th>
</tr>
</thead>
</table>

#### Purpose of the Module
The focus of the learning in this module is to provide learners with an opportunity to be exposed to the broader planning processes and to learn from what the service departments do. The learning takes place during a one month period.

1. **(MUHR) Exposure to the monthly planning processes (Credits: 2)**
   **Scope of work activities:**
   - 1. Update workplace plans
   - 2. Participate in monthly Shift Supervisor planning meetings

2. **(MUHR) Exposure to the relevant services departments (Rock Engineering and Safety (40 shifts total) 8 (Credits: 32)**
   **Scope of work activities:**
   - 1. Observe the work done in the Rock Engineering Department (Answer a checklist of questions that will be provided by the training department)
   - 2. Participate in conducting rock strata audits
   - 4. Observe the work of the Safety Officials (Answer a checklist of questions that will be provided by the training department)
   - Participate in safety audits and inspections.

**Total Credits:**

**Contextualised Workplace Knowledge Required**
- Mine specific planned maintenance schedule
- Mine specific standards regarding services layouts.

**Guidelines for assessment:**
1. All questions that were provided for each of the service departments are completed
correctly.
2. Report regarding the activities of the learner in the service department signed off by the Head of the Service department.

Workplace Resources Required

Human Resources

Physical Resources

Safety, Health and Environment

399910031-WM-4: Prevention of working in a gas hazardous environment (NQF Level:3)

Purpose of the Module
The focus of the learning in this module is to expose learners to gas testing operations and build their experience in testing for hazardous and noxious gasses in a range of relevant circumstances.

1. Examine the calibration of gas testing instruments. (Credits: 1)

Scope of work activities:

- 1. Observe the work done in the lamp room (Gas testing instruments, cap-lamps and self rescuer, proximity warning devices)
- 2. Identify and report potential problems

2. Exposed to the range of commonly used instruments. (Credits: 2)

Scope of work activities:

- 1. Understand the operating principles of instruments used on the specific mine

3. Test for gas during all stages of the blasting cycle. (Credits: 2)

Scope of work activities:

- 1. Test for gas before entering the workplace
- 2. Test for gas during the examination process
3. Test for gas during drilling
4. Test for gas before charging up operations
5. Test for gas after ventilation stoppages.
6. Test for gas when holing into unventilated workings.
7. Test for gas when intersecting water
8. Test for gas whilst working in close proximity to abandoned areas

Total Credits: 5

Contextualised Workplace Knowledge Required

- Mine specific standards and equipment requirements.

Guidelines for assessment:

1. Answer all ten questions correctly regarding the Lamp room Operations and the calibration of gas testing equipment.
2. Retain records of all gas testing and the results - supervisor observes the procedures followed during the testing.

Workplace Resources Required

Human Resources

Physical Resources

Safety, Health and Environment

399910031-WM-5: Faces blasted in virgin rock (Sequential blasting) (NQF Level:3)

Purpose of the Module
The focus of the learning in this module is on providing learners an opportunity to experience the execution of the blasting cycle in a range of work areas on a specific mine for a period of at least two months (One month stoping, one month development)

1. Blast a set number of faces. (Credits: 25)
Scope of work activities:

- 1. Operate within the mine specific blasting cycle to blast a number of faces in stoping
- 2. Operate within the mine specific blasting cycle to blast a number of faces in development
- 3. Charge up using the appropriate charging methods.
- 4. Initiate

Total Credits: 28

Contextualised Workplace Knowledge Required

- Mine specific bonus scheme
- Mine specific disciplinary and grievance procedures.
- Mine specific operating procedures and standards associated with mining activities.
- Mine specific safety communication policies and procedures (Safety Topics)

Guidelines for assessment:

1. The results of the blasts are measured and must comply with the requirements for quality blasting.

Workplace Resources Required

Human Resources

Physical Resources

Safety, Health and Environment

399910031-WM-6: Secondary blasting (Single Shot Blasting) (NQF Level:3)
Purpose of the Module
The focus of the learning in this module is on creating opportunities for learners to gain the appropriate experience in secondary blasting and using blasting to clear ore passes.

1. Breaking of oversized rock and removal of support (Credits: 4)
Scope of work activities:

- 1. Prepare workplaces for blasting inspect and make safe.
- 2. Place explosive on site.
- 4. Charge up and time secondary blasting.
- 5. Initiate secondary blasting.
- 6. Inspect for and deal with misfires.

2. Clear obstructions in rock passes. (Credits: 4)
Scope of work activities:

- 1. Inspect, make safe and prepare the work area.
- 2. Place and connect explosives
- 3. Re-check area and make safe
- 4. Initiate the blast
- 5. Execute post-blasting activities

Total Credits: 8

Contextualised Workplace Knowledge Required

- Mine specific standards

Guidelines for assessment:

1. Successfully break big rocks by means of secondary blasting on at least four occasions.
2. Successfully clear obstructions in ore passes on at least three occasions.

Workplace Resources Required

Human Resources

Physical Resources
Safety, Health and Environment

399910031-WM-7: Blasted ore transported to tips and back areas (NQF Level:3)

Purpose of the Module
The focus of the learning in this module will provide learners an opportunity to experience the work of supervising cleaning activities in an underground hardrock mine for a full production month on Stoping and on Development.

1. (MUHR) Supervise all cleaning and tramming operations on development (Credits: 14)
Scope of work activities:
- 1. Execute start of shift procedures
- 2. Supervise all cleaning activities
- 3. Deal with breakdowns, problems and stoppages
- 4. Execute end of shift procedures

2. (MUHR) Supervise Cleaning operations on stoping (Credits: 14)
Scope of work activities:
- 1. Execute start of shift procedures
- 2. Supervise all cleaning activities
- 3. Deal with breakdowns, problems and stoppages
- 4. Execute end of shift procedures

Total Credits: 28

Contextualised Workplace Knowledge Required
- Mine standards and procedures for end of shift.
- Mine standards and procedures regarding cleaning operations.

Guidelines for assessment:
1. Achieve all production results
2. Execute all safety and health procedures and achieve Safety and Health targets and
standards.

<table>
<thead>
<tr>
<th>Workplace Resources Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Resources</td>
</tr>
</tbody>
</table>

| Physical Resources           |

| Safety, Health and Environment |
# C. Work Experience Record

## Work Experience Record

<table>
<thead>
<tr>
<th>Curriculum Number:</th>
<th>399910 - 031</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curriculum Title:</td>
<td>Miner: Underground Hardrock</td>
</tr>
<tr>
<td>Description:</td>
<td>Miners: Perform blasting and excavation operations to extract ore.</td>
</tr>
</tbody>
</table>

### Learner Details:

- **Name:** 
- **ID Number:**

### Confirmation of Work Experience

<table>
<thead>
<tr>
<th>Work Experience Record</th>
<th>Credits</th>
<th>Date</th>
<th>Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>399910031-WM-1 - Team works effectively (Credit: 8)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MUHR) Order, receive and store explosives and explosive accessories.</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MUHR) Conduct Planned task observations and inspections</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MUHR) Over inspection of all pre use checklists</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MUHR) Conduct team meetings</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **399910031-WM-3 - Minimum wastage (Credit: 8)** | | |
| (MUHR) Exposure to the monthly planning processes | 2 | | |
| (MUHR) Exposure to the relevant services departments (Rock Engineering, Environmental, Safety and Survey) | 6 | | |

| **399910031-WM-4 - Prevention of working in a gas hazardous environment (Credit: 8)** | | |
| Check the Calibration of gas testing instruments. | 2 | | |
| Exposed to the range of commonly used instruments. | 2 | | |
| Test for gas during all stages of the blasting cycle. | 4 | | |
### 399910031-WM-5 - Faces blasted in virgin rock (Credit: 16)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blast a set number of faces.</td>
<td>25</td>
</tr>
<tr>
<td>Blast large excavations.</td>
<td>3</td>
</tr>
</tbody>
</table>

### 399910031-WM-6 – Secondary Blasting (Credit: 8)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breaking of oversized rock</td>
<td>4</td>
</tr>
<tr>
<td>Clear obstructions in ore passes.</td>
<td>4</td>
</tr>
</tbody>
</table>

### 399910031-WM-7 - Blasted ore transported to tips and back areas (Credit: 24)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>(MUHR) Supervise Cleaning operations for a period of 20 shifts on stoping</td>
<td>12</td>
</tr>
<tr>
<td>(MUHR) Supervise cleaning operations for a period of 20 shifts on development</td>
<td>12</td>
</tr>
</tbody>
</table>

### 399910031-WM-8 - Services available (Credit: 16)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervise the construction and supply of services to a mining section for a period of two production months.</td>
<td>8</td>
</tr>
</tbody>
</table>

**TOTAL CREDITS: 80**

### Employer Details:

<table>
<thead>
<tr>
<th>Field</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company Name:</td>
<td></td>
</tr>
<tr>
<td>Physical Address:</td>
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</tr>
<tr>
<td>Tel:</td>
<td></td>
</tr>
<tr>
<td>E-Mail:</td>
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</tr>
<tr>
<td>Supervisor:</td>
<td></td>
</tr>
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</table>
F. Assessment Specification

<table>
<thead>
<tr>
<th>WEIGHT</th>
<th>% Of Items to be assessed</th>
<th>% Pass mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20%</td>
<td>60%</td>
</tr>
<tr>
<td>2</td>
<td>40%</td>
<td>70%</td>
</tr>
<tr>
<td>3</td>
<td>60%</td>
<td>80%</td>
</tr>
<tr>
<td>4</td>
<td>80%</td>
<td>90%</td>
</tr>
<tr>
<td>5</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

External Assessment Specification – Miner Underground Hard Rock

<table>
<thead>
<tr>
<th>Occupational Outcome</th>
<th>Area to be Assessed</th>
<th>Assessment Criteria</th>
</tr>
</thead>
</table>
| 1. Mining Team Works      | 1.1. Processes and practices related to mine reporting and management processes and procedures (Inter shift handover, incident reporting, etc.) (Intermediate) (W3 – O) | 1.1.1. *Explain* the importance of and practices associated with inter shift and in shift handover:  
a) The need for proper inter-shift handover and the consequences of non-adherence.  
b) Key aspects to be communicated between shifts and the risks and consequences of not communicating all information.  
1.1.2. *Identify* the key aspects from the reports and management information:  
a. Key things that could go wrong and that should always be checked;  
b. Things that must always be reported;  
c. Things that could influence each other.  
|                            | 1.2. Principle of planning and problem solving (Intermediate) (W4 – O)              | 1.2.1. *Explain* the types and purpose of plans and planning cycles:  
a. Short, medium and long term planning (Daily, weekly and monthly);  
b. Techniques of setting of objectives and goals (SMART).  
1.2.2. *Explain* the influences of good planning on the workplace:  
a. Impact on Safety and Occupational Health;  
b. Impact on production; |
| 1.3. Principles of the efficient utilisation of labour (Labour efficiencies) (Intermediate) (W2 – W) | 1.3.1. **Explain** the legislative requirements that impact on labour control as set out in the basic conditions of employment act. (Working hours, overtime, leave)  
1.3.2. **Explain** how to calculate labour efficiencies, why it is important and what the role of the miner is in managing labour efficiency |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.4. Execute all start and end of shift procedures (Advanced) (W5 – W)</td>
<td>1.4.1. <strong>Explain</strong> the legislative requirements regarding statutory examinations and record keeping.</td>
</tr>
</tbody>
</table>
| 2.1. Concepts and applications of strata control principles in an underground hard rock mine (Intermediate) (W5 – W/O) | 2.1.1. **Explain** the Naturally occurring Geological discontinuities:  
   a. Influences of forces on rock strata.  
   b. Definitions of the various types of discontinuities in rocks (faults, slips, joints, fold, dykes, sills, potholes, weathering, fissures, hydraulic and pneumatic pressures, bedding planes, bed separation);  
   c. Hazards and risks associated with the various geological discontinuities.  
2.1.2. **Explain** Mining induced geological disturbances:  
   a. Definition of mining induced disturbances (bed separation);  
   b. Causes of mining induced disturbances (Incorrect mining practices, exceeding mining parameters, induced forces);  
   c. Consequences of mining induced disturbances on rock strata.  
2.1.3. Explain how to identify rock strata conditions:  
   a. How to identify Natural as well as induced discontinuities and anomalies;  
   b. How to interpret the impact of the various discontinuities and anomalies.  
2.1.4. Explain the basic strata control principles:  
   a. Various actions to mitigate the impact on strata conditions and the work environment. |
| 2.2. Identification, treatment and removal of misfires (Advanced) (W5 – O/W) | 2.2.1. **Explain** what a misfire is:  
   a. Legal definition of a misfire;  
   b. How to identify a misfire;  
   c. Causes of misfires;  
   d. Hazards and dangers associated with misfires.  
2.2.2. Describe the process of dealing with misfires:  
   a. Preparing to remove and deal with misfires (Key steps, associated risks, required protective equipment and why the PPE is important, Required tools and equipment that should be used in the destruction of old explosives);
## 2.3. Principles and practices for the destruction of old explosives (Advanced)  
**W5 – O/W**

### 2.3.1. Define old explosives and the need to remove and destroy them:
- a. What is defined as an old explosive;
- b. Reasons for effectively dealing with old explosives;
- c. Criteria for recognising old explosives.
- d. Legal requirements relating to the destruction of old explosives.

### 2.3.2. Describe the process of dealing with old explosives:
- a. Preparing to destroy old explosives (Key steps, associated risks, required protective equipment and why the PPE is important, Required tools and equipment that should be used in the destruction of old explosives);
- b. Precautions to be taken (Placement of guards, barricades and warning signs, Preventing the inadvertent entry of people into the area where old explosives will be destroyed, testing for harmful gasses, watering down and the removal of combustible and flammable substances.)

### 2.3.3. Explain the key steps in destroying old explosives:
- a. Placing and securing of the old explosives;
- b. Connecting and timing the destructive blast;
- c. Potential risks and hazards; post destruction inspections;
- d. Administrative procedures and reporting requirements.

## 2.4. Receive, handle, store, transport and control explosives and accessories (Advanced)  
**W3 – W/O**

### 2.4.1. (W3) Explain the conditions under which explosives and accessories must be stored giving examples of what could go wrong if these conditions are not adhered to:
- a. Conditions to minimise deterioration of the efficacy of the products;
- b. Conditions relating to the need for separating incompatible products;
- c. Conditions that will minimise the risk of accidental explosions;
- d. Conditions that will limit access to the explosives to authorised people only;
- e. Conditions to ensure compliance with legislatory requirements.

### 2.4.2. (W3) Describe the categorisation of explosives and identify the various categories using the industry numbering and coding system:
- a. What each category means;
- b. The hazards associated with products in each category;
- c. Which products can be transported together;
- d. The legal requirements relating to the handling and transportation of explosives and accessories;
- e. The consequences of non adherence to the legal requirements.
| Topic                                                                 | 2.4.3. **(W5) Explain** the process for handling, storing and transporting explosives and explosive accessories:  
|                                                                      | a. Requirements regarding pre-inspections;  
|                                                                      | b. Description of the indicators that there is something wrong with the explosives and accessories;  
|                                                                      | c. Identification of the PPE, tools and equipment that will be required for handling, storage and transportation of explosives;  
|                                                                      | d. Administrative requirements for controlling explosives and accessories.  
| 2.4.4. **(W3) Describe** the legal roles and responsibilities of all stakeholders regarding the handling, storage and transportation of explosives:  
|                                                                      | a. Responsibilities of the supplier;  
|                                                                      | b. Responsibilities of staff receiving explosives;  
|                                                                      | c. Responsibilities of staff transporting explosives underground;  
|                                                                      | d. Responsibilities of the Mine Overseer regarding explosives and accessories;  
|                                                                      | e. Responsibilities of the Shift Supervisor regarding explosives and accessories;  
|                                                                      | f. Responsibilities of the Miner, Team Leader and Blast Assistant regarding explosives and accessories.  
| 2.4.5. **(W4) Explain** what preventative and contingency actions must be taken when handling, storing and transporting explosives:  
|                                                                      | a. Actions to deal with hazards and potential hazards;  
|                                                                      | b. Actions to deal with contraventions of the legislatory requirements;  
|                                                                      | c. Actions to be taken in an emergency situation whilst handling, storing or transporting explosives. (Fire, detection of dangerous gasses, road or rail accidents, injury to people, all other possible incidents)  
| 2.5. **(Advanced)** Blasting down of hazardous ground.  
|                                                                      | 2.5.1. **Explain** what is meant by Hazardous ground and what significant risks and consequences associated with the workplace hazards pertaining to the removal of hazardous ground:  
|                                                                      | a. How to identify hazardous ground;  
|                                                                      | b. Conditions under which hazardous ground must be blasted down;  
|                                                                      | c. Alternative methods of dealing with hazardous ground.  
|                                                                      | 2.6.1. **Explain** the Process for conducting risk assessments indicating when to apply the various types of assessments.  
|                                                                      | a. Explain the different types of risk assessments (Issue based, base-line, continuous and pre-emptive risk assessments)  
|                                                                      | b. The concept of cause and effect;  
|                                                                      | c. Steps for conducting risk assessments;  
|                                                                      | d. Identifying preventative and contingency actions.  
| 2.7. Concepts and  
| 2.7.1. **Explain** what heat exhaustion and heat stroke is:
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
</table>
| **2.7.** | **Describe** what actions must be taken to prevent heat related conditions:  
  a. Regular monitoring of the workplace temperatures;  
  b. Permissible limits of temperatures;  
  c. Observation of employees for the presence of symptoms. |
| **2.7.3.** | Explain the actions to be taken when conditions could cause heat related symptoms in employees. |
| **2.8.** | Explain waiting place and statutory examination procedures:  
  a. Definition of competent persons;  
  b. Purpose and legal requirements for waiting places underground;  
  c. Requirements for legal waiting places;  
  d. Procedures at the waiting place (Start and end of shift);  
  e. Typical waiting place layout. |
| **2.8.2.** | Describe the purpose, responsibilities and processes to conduct statutory examinations:  
  a. Initial examinations;  
  b. Procedures when working places are idle for more than 6 hours;  
  c. Inspections during the shift (normal conditions, pillar extraction, testing for gas, misfires and sockets, stoppages of ventilation);  
  d. Exemptions (initial examination by competent person, changeover at face in multi shift operations, inspections during the shift, re-entry into working places blasted during the shift and examination for misfires, holes and sockets). |
| **2.8.3.** | Describe and interpret the Mine health and Safety act and regulations relating to handling explosives (Regulations chapter 4):  
  a. Definition of explosives;  
  b. Definition of initiation and initiation systems;  
  c. Definitions of all related terms (misfire, misfired hole, primary blasting, secondary blasting, shot hole, socket);  
  d. Security in respect of explosives;  
  e. Receipt, storage, issuing, transportation and destruction of explosives;  
  f. Approved explosives at mines;  
  g. Primary and Secondary blasting to be performed by competent persons;  
  h. Responsibilities of Blasting Assistants;  
  i. Certification of initiation Apparatus and Blasting Systems; |
| 2.9. | The definitions of safety related terminology as specified in the Mine Health and Safety Act. (Intermediate) | 2.9.1. **Explain** all the terms related to the work of a miner:
- Appointments and administration;
- Use of equipment, machinery and electricity;
- Handling of Explosives;
- Preventing and dealing with fires and explosions;
- Working with safety representatives and committees;
- Emergency preparedness;
- Surveying, Mapping and Mine Plans.  
**2.9.2. Describe and interpret** the Mine health and Safety act and regulations relating to handling explosives (Regulations chapter 4):
- Definition of explosives;
- Definition of initiation and initiation systems;
- Definitions of all related terms (misfire, misfired hole, primary blasting, secondary blasting, shot hole, socket);
- Security in respect of explosives;
- Receipt, storage, issuing, transportation and destruction of explosives;
- Approved explosives at mines;
- Primary and Secondary blasting to be performed by competent persons;
- Responsibilities of Blasting Assistants;
- Certification of initiation Apparatus and Blasting Systems;
- General precautionary measures when blasting;
- Prevention of flammable gas and coal dust explosions;
- Shot Holes to be Stemmed. |
| 2.10. | Relevant requirements in terms of the explosives act (Basic) | 2.10.1. **Explain** the relevant sections of the explosives act as it pertains to the work of the miner with specific reference to the consequences of contravention of the act:
- Inspections, entry and search by the inspector;
- Destruction of explosives;
- Storing and transporting explosives;
- Prohibition on the use of explosives without a permit;
- Record Keeping;
- Presumption of possession of explosives;
- Offences, penalties and appeals. (Regulation 40 and annexures) |
| 2.11. | Handle withdrawals from dangerous workplaces | 2.11.1. **Explain** the relevant legal requirements relating to dangerous situations and the withdrawal of workers. Consequences of not responding appropriately. |
### 2.12. Read, interpret and update a section plan.

**W4 - O**

**Given** a completed mine plan, and a plan of specific workings (stope sheet as well as production plans and results and relevant services department reports for a work area. **Be able to:**

1. Calculate volumes, tonnes, and face advance (distances) using the mine plan.
2. Plot and update the section plan with the production information.
3. Interpret the plan and describe the implications of the conditions on the mine plan related to the specific working area in terms of safety, production and cost.
4. Identify and describe: 1. All geological features indicated on the plan; 2. all infrastructures indicated on the plan; 3. Identify the direction and coordinates on the plan.
4. Distinguish the elevation and gradient (dip and strike)
5. Identify the boundaries and pillars.
6. Identify the types of excavations (shafts, sub shafts, drives cross-cuts, drives, traveling ways.
7. Identify the position of survey pegs and stations.
8. Identify restricted areas and abandoned workings.
9. Identify all dams.
10. Lines indicating the planes of sections.
12. Falls of ground.

**Guidelines for assessment:**

1. **APPLIED KNOWLEDGE:** Test understanding of the concepts and principles of mine survey. (a. Definition and purpose of the different types of mine plans (1:500, 1:1000, 1:1500, 1:5000, 1:10000, 1:200), b. Legal requirements covered on the various mine plans (including survey notes, holing notes, start up notes. c. Plan layout and all symbols and signage used on mine plans d. Implication of non adherence to requirements on mine plans.
2. Evaluate that all features and orientations on the plan is correctly identified and described.
3. Evaluate the accuracy of the interpretation and that all implications related to safety, production and cost have been identified and correctly described.
4. Evaluate that all calculations are correctly done.
5. Observe the process of plotting and updating the plan checking accuracy, neatness and completeness.

<table>
<thead>
<tr>
<th>2.13.</th>
<th>Concepts and principles of mine geology (Intermediate)</th>
<th><strong>W2 – W</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>2.13.1. <strong>Explain</strong> the Terms and definitions used in mine geology (Stratification of ore deposits, reef, on reef, internal waste, external waste, channel width); b. Identify and describe the Rock types associated with various mineral deposits.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.13.2. <strong>Explain</strong> the Principles of mine valuation: a. Definition of pay-limits including mine call factor; b. The meaning of ore dilution and the factors influence it. c. Time cost factor on ore recovery. d. Implications of the work of a miner on ore recovery.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 3. Minimum wastage of resources in a mining area of responsibility.
### 2.13.3. Indicate how the miner impacts on the improvement of the mine call factor

|-------|------------------------------------------------------------------------------------------------|

#### 2.14.1. Identify and describe the various types of explosions:

- a. Controlled explosions;
- b. Uncontrolled explosion (Accidental initiation of explosives, gas, ignitable dust, deflagration of explosives, flammable materials/petroleum).

#### 2.14.2. Explain the definition of an explosion:

- a. What is an explosion;
- b. Causes of explosions (lack of ventilation (Poor application of ventilation appliances), accumulation of gas and dust, blown out shot holes, faulty electrical equipment, substandard flame proofing, inadequate control and handling of explosives, contraband, inadequate dust suppression), poor face preparation)

#### 2.14.3. Impact and implications of explosions:

- a. Impact on the health and safety of people;
- b. Impact on production and mining revenue;
- c. Impact on costs and the future of the mine;
- d. Legal consequences and implications.

#### 2.14.4. Actions to deal with explosions:

- a. Safety precautions for controlled explosions;
- b. Preventative actions to avoid the causes of uncontrolled explosions;
- c. Contingency actions to deal with the consequences of uncontrolled explosions.

#### 2.14.5. Explain the actions to prevent uncontrolled explosions:

- a. Drilling of pilot holes, cover drilling, continuous gas and ventilation monitoring and controlling, proper storage, transport and handling of explosives, application of dust allaying principles, adhering to face preparation procedures, control of contraband, proper maintenance and flame proofing, ensuring the competence of employees)

### 3. Prevention of work in a gas hazardous environment

<table>
<thead>
<tr>
<th>3.1.</th>
<th>Origin, properties, effects, occurrence, limits and treatment of harmful gasses <em>(Intermediate)</em></th>
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</table>

#### 3.1.1. Explain the types of gases and their properties found in an underground hard rock mine:

- a. What are the different gases;
- b. Hazards and risks associated with the different types of gases.

#### 3.1.2. Explain the Importance of testing for basic gases:

- a. Preparation required;
- b. Testing and monitoring instruments and the selection of the correct instrument.

#### 3.1.3. Indicate how to deal with hazardous gases:
| 4. Faces blasted in virgin rock (Primary blasting) | 4.1. Concepts and principles associated with quality blasting practices *(Advanced)* | 4.1.1. **Explain** the Definition and characteristics of a quality blast (How do we know a blast is a quality blast):  
   a. Optimum face advance;  
   b. Face shape and condition;  
   c. Optimal fragmentation;  
   d. Grades and directions;  
   e. No damage to support and services.  
   
4.1.2. **Explain** the factors effecting the quality of a blast:  
   a. Impact of face preparation (properly barred down and cleaned - solid face, misfires and sockets);  
   b. Impact of marking and drilling (burdens, spacing, direction, dip/elevation, depth, size of the hole, cleanliness (de-slugging) of the hole);  
   c. Impact of charging (Types of explosives, use of initiation systems, charging length, stemming/tamping length, various charging methods);  
   d. Impact of timing and sequencing the blast;  
   e. Free face creation. |
|---|---|---|
| 5. Rock blasted (Secondary Blasting) | 5.1. Breaking big rocks by means of secondary blasting | 5.1.1. **Explain** specified requirements regarding the breaking of big rocks by means of blasting;  
   a. Significant risks and consequences associated with the workplace hazards pertaining to the breaking of big rocks by means of blasting, is according to specified requirements. (Ground conditions, Support conditions, Flammable and noxious gases, Rocks that could possibly roll down inclined excavations, Fire, Exposure to unsafe Electrical connections, Working under unsafe roof or sidewalls.)  
   
5.1.2. **Explain** the significant risks and consequences associated with the work related hazards pertaining to the breaking of big rocks according to specified requirements;  
   a. Hazards associated with working with explosives and accessories;  
   b. Requirements when working in the proximity of moving machinery;  
   c. Need for and requirements for moving or re-positioning the rocks.  
   
5.1.3. **Describe** the specified requirements pertaining to explosive products to be used for breaking large rocks.  
   a. Types of explosives and accessories;  
   b. Burning speed of fuses and igniter cord;  
   c. Delay times for detonators;  
   d. Sequence of timing.  
   
5.1.4. **Explain** the standard procedures and processes that must be followed when preparing to break big rocks by means of blasting:  
   a. Identify the required protective equipment and check that it is in good condition. |
| working order; | b. Identify and check the operational efficiency of all required equipment; |
| c. Describe the specific requirements for inspecting and preparing the area where the blasting is to take place. |

| 5.2. Removal of obstructions in rock passes (Advanced) W4 – W/O | 5.2.1. **Explain** specified requirements pertaining to the removal of an obstruction from an ore pass by means of blasting: |
| | a. The significant risks and consequences associated with the workplace hazards pertaining to the removal of an obstruction from an ore pass by means of blasting; (Unsafe ground conditions, flammable and noxious gasses, Rocks that could roll down inclined excavations, fire, exposure to unsafe electrical connections, working under unsafe hanging and sidewalls, falling.) |
| | b. The significant risks and consequences associated with the work related hazards pertaining to the removal of an obstruction from an ore pass by means of blasting (Working at heights, Working in confined spaces, working in the proximity of rolling stock); |
| | c. The specified requirements regarding the action to be taken should the charge misfire or fail to explode within the specified time limit; |
| | d. The specified requirements related to product specifications in terms of usage of the explosives and accessories (Types of explosives and accessories, burning speeds of fuse and igniter cord, delay times of detonators, sequence of timing) |

| 5.2.2. **Describe** the process for preparing to remove an obstruction from an ore pass: |
| a. Fit for purpose PPE; Appropriate tools, equipment and material; |
| b. Examination and preparation of the area where the obstruction must be removed (Unsafe ground conditions, flammable and noxious gasses, loose rocks, electrical connections, unsafe roof and sidewalls, protruding steel or other sharp edged objects). |
| c. Selection of the types and quantities of explosives and accessories to deal with the specific situations; |
| d. Obtaining permission to blast (Responsible person, documentation, communication) f. Precautions to be taken to prevent injuries, gassing, explosions and fires. (placements of guards and warning signs, warning of persons, testing for harmful gases, watering down and removal of combustible and flammable substances) |
| e. Requirements pertaining to the preparation of the charge. |

| 5.2.3. **Describe** the consequences to safety, occupational health and production, if specified requirements are not adhered to whilst preparing to remove an obstruction from an ore pass |
### 5.2.4. Describe the specific requirement for placing and initiating a charge to blast down an obstruction in an ore pass:
- a. Alternative methods of positioning and securing the charge;
- b. Final checks and safety requirements before initiating the charge;
- c. Actions to prevent damage to people and equipment;
- d. Communication requirements;
- e. Safe positions from which to initiate the charge;
- f. post blasting activities.

### 6. Services available to a mining section.

| 6.2. Concepts and principles of environmental control in an underground hardrock mine. (Intermediate) | 6.2.1. Explain the ventilation requirements for an underground hard rock mining operation;  
- a. Purpose and use of the main fan;  
- b. Reasons for ventilation;  
- c. Required quality for mine air;  
- d. Definition and requirements for a ventilation district (code of practice for ventilation, most important items to be addressed as far as ventilation is concerned, air measurements, failures to comply to codes of practice and implementation and maintenance of the code of practice)  
6.2.2. Use section and mine plans to describe the key elements of ventilation plans:  
- a. conventional ventilation signs for underground plans;  
- b. positioning and use of double doors, air crossings and regulators  
6.2.3. Describe ventilation practices to control dust:  
- a. air coursing/splitting  
- b. methods of measuring velocity of air by using a stop watch, tape and smoke tube;  
- b. Determining the percentage of air utilisation  
- c. factors influencing utilisation of air (leakage through permanent stopping’s, conditions of lime brattices and fan ducting, leakage through temporary stopping’s, number of open through roads) | 6.1. Principles of maintenance and construction in mines (Basic) | 6.1.1. Explain the Legal requirements relating to working with electrical and mechanical equipment:  
- a. Need to do pre-use and post-use inspections;  
- b. Who is authorised to do maintenance work;  
- c. Protection and lock out procedures.  
6.1.2. Explain the principles and concepts of rigging, lifting and moving of material and equipment;  
6.1.3. Describe the mine reticulation systems and column support practices | W3 – W/O | W1 - W |
| | | **d. auxiliary ventilation to working faces (scoop and lime brattices)**
| | | **e. starting or restarting of section electric fans** |