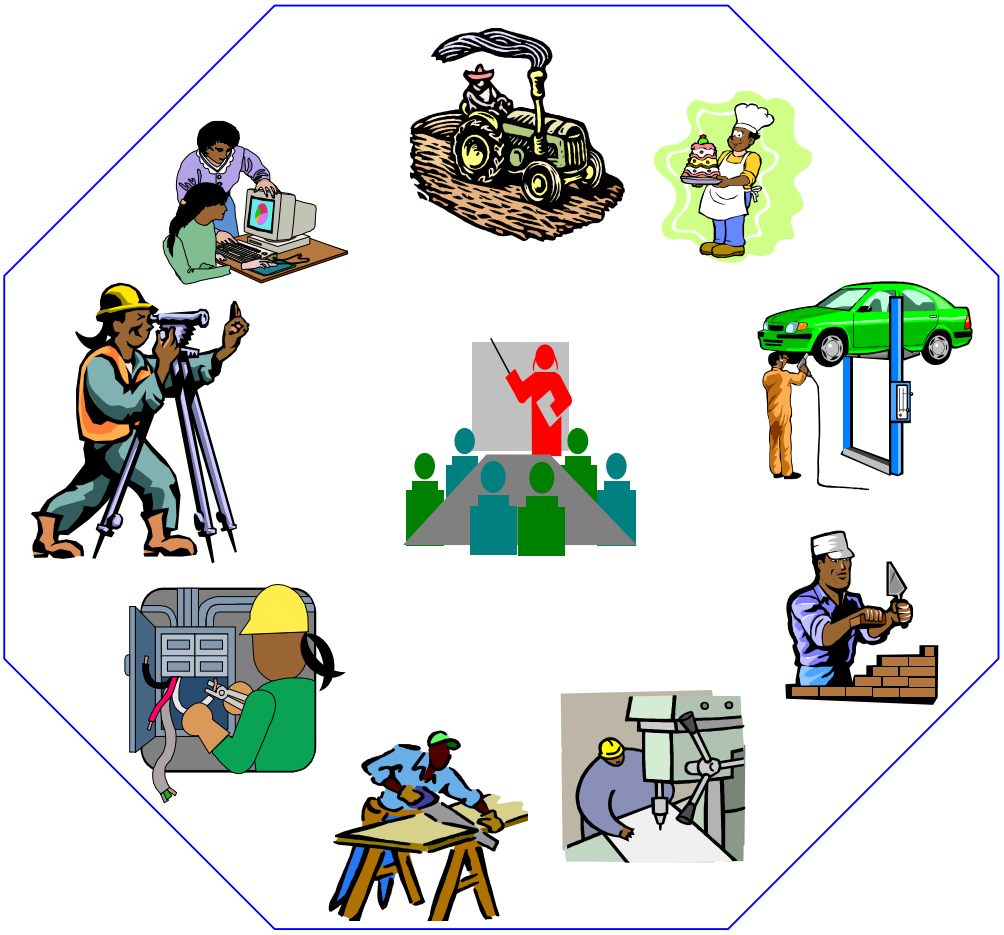
Federal Democratic Republic of Ethiopia

OCCUPATIONAL STANDARD

UNDERGROUND MINING

NTQF Level II, III and IV



Ministry of Education
January 2014

Introduction

Ethiopia has embarked on a process of reforming its TVET-System. Within the policies and strategies of the Ethiopian Government, technology transformation – by using international standards and international best practices as the basis, and, adopting, adapting and verifying them in the Ethiopian context – is a pivotal element. TVET is given an important role with regard to technology transfer. The new paradigm in the outcome-based TVET system is the orientation at the current and anticipated future demand of the economy and the labor market.

The Ethiopia Occupational Standards (EOS) is the core element of the Ethiopian National TVET-Strategy and an important factor within the context of the National TVET-Qualification Framework (NTQF). They are national Ethiopian standards, which define the occupational requirements and expected outcome related to a specific occupation without taking TVET delivery into account.

This document details the mandatory format, sequencing, wording and layout for the Ethiopia Occupational Standard which comprised of Units of Competence.
A Unit of Competence describes a distinct work activity. It is documented in a standard format that comprises:

- Occupational title and NTQF level
- Unit title
- Unit code
- Unit descriptor
- Elements and Performance criteria
- Variables and Range statement
- Evidence guide

Together all the parts of a Unit of Competence guide the assessor in determining whether the candidate is competent.

The ensuing sections of this EOS document comprise a description of the occupation with all the key components of a Unit of Competence:

- chart with an overview of all Units of Competence for the respective level including the Unit Codes and the Unit Titles
- contents of each Unit of Competence (competence standard)
- occupational map providing the Technical and Vocational Education and Training (TVET) providers with information and important requirements to consider when designing training programs for this standards and for the individual, a career path

UNIT OF COMPETENCE CHART

Occupational Standard: Underground Mining

Occupational Code: MIN UGM

NTQF Level II

MIN UGM2 01 0114 Support Underground Blasting Operations	**MIN UGM2 02 0114** Support Surface Blast Hole Drilling Operations	**MIN UGM2 03 0114** Prepare and Perform Manual Scaling Operations
MIN UGM3 04 0114 Conduct Crushing, Screening and Conveying Operations	**MIN UGM2 05 0114** Operate from Elevated Work Platform Underground	**MIN UGM2 06 0114** Read Plans and Specifications
MIN UGM2 07 0114 Install Primary Ground Support	**MIN UGM2 08 0114** Escape from Hazardous Situation Unaided	**MIN UGM2 09 0114** Conduct Pump Operations
MIN UGM2 10 0114 Participate in Workplace Communication	**MIN UGM2 11 0114** Work in Team Environment	**MIN UGM2 12 0114** Develop Business Practice
MIN UGM2 13 0114 Standardize and Sustain 3S		

NTQF Level III

MIN UGM3 01 0114 Apply Environmentally Sustainable Work Practices	**MIN UGM3 02 0114** Apply Risk Management Processes	**MIN UGM3 03 0114** Store, Handle and Transport Explosives
MIN UGM3 04 0114 Support Operational Plan	**MIN UGM3 05 0114** Conduct Continuous Miner Operations	**MIN UGM3 06 0114** Conduct Underground Blast Hole Drilling
MIN UGM3 07 0114 Conduct Underground Blasting Operations	**MIN UGM3 08 0114** Read and Interpret Plans and Specifications	**MIN UGM3 09 0114** Apply Shot-crete Underground
MIN UGM3 10 0114 Inspect and Maintain Shafts and Structures	**MIN UGM3 11 0114** Conduct Auger Miner Operations	**MIN UGM3 12 0114** Conduct Stockpile Reclaiming Operations
MIN UGM3 13 0114 Conduct Skip and Cage Operations	**MIN UGM3 14 0114** Conduct Flexible Conveyor Train (FCT) Operations	**MIN UGM3 15 0114** Conduct Control Room Operations
MIN UGM3 16 0114 Take Environmental Samples and Measurements	**MIN UGM3 17 0114** Conduct Basic and Specialized Strata Control Operations	**MIN UGM3 18 0114** Operate Winder for Shaft Sinking
MIN UGM3 19 0114 Monitor Implementation of Work Plan/Activities	**MIN UGM3 20 0114** Apply Quality Control	**MIN UGM3 21 0114** Lead Workplace Communication
MIN UGM3 22 0114 Lead Small Teams	**MIN UGM3 23 0114** Improve Business Practice	**MIN UGM3 24 0114** Prevent and Eliminate MUDA

NTQF Level IV

MIN UGM4 01 0114 Apply and Monitor Mine Operations Emergency Preparedness and Response Systems	**MIN UGM4 02 0114** Apply, Monitor and Report on Compliance Systems	**MIN UGM4 03 0114** Implement Work Place Information System
MIN UGM4 04 0114 Carry out the Risk Management Processes	**MIN UGM4 05 0114** Implement and Monitor Environmentally Sustainable Work Practices	**MIN UGM4 06 0114** Apply and Monitor Systems for Stable Mining
MIN UGM4 07 0114 Manage Drill and Blasting Operations	**MIN UGM4 08 0114** Monitor and Control the Effects of Blasting on the Environment	**MIN UGM4 09 0114** Apply and Monitor the Gas Drainage Management Plan
MIN UGM4 10 0114 Monitor and Maintain the Ventilation Management Plan	**MIN UGM4 11 0114** Establish and Maintain Mine Services and Infrastructure Systems	**MIN UGM4 12 0114** Apply and Monitor the Outburst Management Plan
MIN UGM4 13 0114 Identify and Assess Environmental and Heritage Concerns	**MIN UGM4 14 0114** Lead Rescue Team	**MIN UGM4 15 0114** Coordinate Implementation of Customer Service Strategies
MIN UGM4 16 0114 Apply Pit Plan	**MIN UGM4 17 0114** Plan and Organize Work	**MIN UGM4 18 0114** Migrate to New Technology
MIN UGM4 19 0114 Establish Quality Standards	**MIN UGM4 20 0114** Develop Individuals and Team	**MIN UGM4 21 0114** Utilize Specialized Communication Skills
MIN UGM4 22 0114 Manage and Maintain Small/Medium Business Operations	**MIN UGM4 23 0114** Apply Problem Solving Techniques and Tools	

Occupational Standard: Underground Mining Level II	
Unit Title	**Support Underground Blasting Operations**
Unit Code	**MIN UGM2 01 0114**
Unit Descriptor	This unit covers supporting underground blasting operations in mining industry. It includes: planning for supporting blasting; providing support at the blast site; and clearing the site.

Elements	Performance Criteria
1. Plan for supporting blasting	1.1. ***Compliance documentation*** relevant to supporting underground blasting operations is applied. 1.2. Environmental, ***geological and survey data*** required to complete the allocated work is applied. 1.4. All potential hazards are identified and reported. 1.5. Coordination requirements are resolved with others at the site prior to commencement of, and during, the work activity.
2. Provide support at the blast site	2.1. Blast site is ***established***, ***secured*** and isolated. 2.4. ***Explosion inhibitor*** is applied. 2.6. Ensure ***explosives*** are transported in accordance with requirements and procedures. 2.7. The explosives are loaded and the charged holes stemmed. 2.8. Hazardous and emergency situations are recognized and response given.
3. Clear the site	3.1. Help to remove equipment and facilities not required from the blast site. 3.2. Help to secure and muck-out the blast site following the initiation of the blast.

Variable	Range
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Geological and survey data	may include: • wet or dry holes • blast pattern plan

	• deputies reports • details of cracking in holes
Site establishment and security	may include: • warnings • area clearance/isolation/barricading • other legislative requirements • safety distances and control/responsibilities
Explosive inhibitor	may include: • stone • dust
Types of explosives	may include: • for wet or dry blast holes • variable density • packaged free flowing • bulk • Cart ridged • initiators
Blasting accessories	may include: • shot firing cable • stemming equipment • crack detector • flushing wand

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • knowledge of the requirements, procedures and instructions for supporting underground blasting operations • implementation of requirements, procedures and techniques for the safe, effective and efficient supporting of underground blasting operations • working with others to undertake and complete the underground blasting operations that meet all of the required outcomes • consistent timely supporting of underground blasting operations that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • site personnel and operational safety requirements • legislative and site blasting requirements • operational and maintenance procedures • mining operation
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures • apply personal and operational safety requirements • read geological and survey data

	• apply procedures for cleaning and testing holes • apply explosives and detonators handling requirements and procedures • identify potential hazards • apply record maintenance requirements • use tools required to complete task • apply environmental compliance requirements
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level II	
Unit Title	**Support Surface Blast Hole Drilling Operations**
Unit Code	**MIN UGM2 02 0114**
Unit Descriptor	This unit covers the conducting of surface blast hole drilling operations in resources and infrastructure industries. It includes planning and preparing for operations, marking out drill patterns, operating the drill system, relocation of the drill, and carrying out post-operational procedures.

Elements	Performance Criteria
1. Plan and prepare for operations	1.1. ***Compliance documentation*** relevant to the conducting of surface blast hole drilling operations is applied. 1.2. ***Work requirements and procedures*** are obtained for the satisfactory completion of the allocated job. 1.3. ***Geological*** and ***survey data*** required to complete the allocated job is applied. 1.4. ***Work area is prepared*** in coordination with others to work requirements and procedures. 1.5. ***Potential hazards and risks*** are identified and reported in accordance with requirements and procedures. 1.6. ***Coordination*** requirements are resolved with others at the site prior to commencing and during work activities in accordance with requirements and procedures. 1.7. Personal protective ***equipment*** appropriate for work activities is selected in accordance with requirements and procedures.
2. Mark out drill pattern	2.1. Indicators on drill pattern are placed in preparation for drilling in accordance with requirements and procedures. 2.2. Drill pattern ensuring it is visible and aids the drilling process is marked out in accordance with site requirements and procedures. 2.3. Pre-existing drill holes are protected according to characteristics of hole and in accordance with requirements and procedures.
3. Operate the drill system	3.1. ***Pre-start***, ***start-up***, ***park-up and shutdown procedures*** are carried out in accordance requirements and procedures. 3.2. Hazardous and emergency situations are recognized in accordance with the requirements and procedures. 3.3. Work is completed in accordance with the agreed work requirements and within the operating capacity of the allocated equipment.

	3.4. Emergency procedures are adhered to ensure safety of personnel, plant and equipment.
4. Relocate drill	4.1. ***Work area preparation*** is completed and/or followed in accordance with requirements and procedures. 4.2. Coordination issues are resolved in accordance with requirements and procedures. 4.3. Drill is relocated in accordance with the requirements and procedures.
5. Prepare for sampling	5.1. Compliance documentation relevant to the collection of routine site samples is accessed, interpreted and applied. 5.2. The purpose, priority and scope of the sample request or plan are confirmed. 5.3. Sampling is liaised with relevant personnel to arrange site access and all necessary clearances/permits. 5.4. Site hazards are identified and enterprise safety procedures reviewed. 5.5. Procedures are used and documented to ensure representative sampling. 5.6. Quantity, location, frequency or time of sampling and types of samples to be collected are confirmed. 5.7. Required sampling tools and equipment are assembled.
6. Conduct sample collection	6.1. Samples are collected as specified in sample request or plan. 6.2. Sample integrity is preserved throughout collection. 6.3. Samples are placed in suitable containers and labeled accurately. 6.4. Samples are stored and transported. 6.5. Characteristics of sampling environment, in particular any non-standard aspects are identified and recorded. 6.6. Sampling equipment is maintained in a clean and safe working condition.
7. Prepare samples	7.1. Sample, check documentation and required equipment are verified for preparation. 7.2. Sample preparation is performed according to plan using recommended procedures. 7.3. Loss of material is contained and sample protected against contamination. 7.4. Samples are recovered and cleaned using techniques and equipment specified for the particular sample. 7.5. Residues and samples are stored or disposed of following OHS

	and environmental guidelines.
8. Carry out post-operational procedures	8.1 ***Routine operator servicing***, ***maintenance and housekeeping*** tasks are carried out in accordance with requirements. 8.2. Operator support is provided during preparation for and conduct of major maintenance tasks in accordance with requirements. 8.3 Records and reports are maintained and processed in accordance with requirements and procedures.

Variable	**Range**
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Work requirements and procedures	May include: • nature and scope of tasks • achievement targets • operational conditions • dust suppression • site layout and out of bounds areas • worksite inspection requirements • lighting conditions • plant or equipment defects, • hazards and potential hazards • coordination requirements or issues • underground mining methods
Geological data	may include relevant site-specific information in relation to: • rock type and characteristics • faults and joints • water tables or other water sources
Survey data	may include relevant site-specific information in relation to: • floor heights • bench widths • grades
Preparation of the work area	May include: • safeguarding site and non-site personnel by: ➢ erection of barricades and posting of signs ➢ selection of appropriate equipment to ensure personnel safety and protection
Potential hazards and risks	May include: • abandoned equipment • adjoining underground walls • electrical storms, floods, fires • contaminants

	• equipment • holes • materials • over-hanging rocks • pot holes • unsafe ground • unstable faces • vehicles • Installed services • damaged or defective pressurized hoses and fastenings • power lines • dust • noise • conveyors • overhead services • void • tow and bent rods • changing work conditions • void management
Coordination	may include with: • maintenance personnel • cable reelers • water truck operators • service vehicle operators • crane and float operators • other drillers • inspectors • supervisors
Equipment	May include: • helmets • tapes, signs, flags, pegs • rope • measuring tape • cutting implements • ancillary equipment (generators, pumps, lights, compressors, cleaning equipment, power tools and hand tools)
Pre-start and start-up procedures	May include: • external check of the machine • checking and toping up fluid levels (including windscreen washer tank, hydraulic oil, coolant, grease, water, engine oil, fuel) • lubrication • reporting defects and damage • air filter restriction indicator
Routine operator service,	May include: • scheduled servicing

maintenance and housekeeping	• changing bits, rods, shanks and drive bushes • greasing • bit sharpening and tool servicing • cleaning, which may include: ➢ degreasing ➢ forced air ➢ steam cleaning ➢ vacuum ➢ water ➢ centralizer/gate adjustment/repair ➢ dust collector/filter bag changes ➢ accumulator recharging ➢ drifter travel alignment and changing • removing: ➢ broken drill bits ➢ rags ➢ rock chips
Inspection of the work area	May include: • identification of hazards • confirming geological and survey data, which may include: ➢ amount of scale ➢ stability of ground ➢ broken ground ➢ dry and wet ground ➢ slope of working surface • determination of appropriate path of movement for equipment

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • knowledge of the requirements, procedures and instructions for conducting surface blast hole drilling operations • implementation of requirements, procedures and techniques for the safe, effective and efficient conducting of surface blast hole drilling operations • working with others to undertake and complete surface blast hole drilling operations that meets all of the required outcomes • consistent timely completion of surface blast hole drilling operations that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • legislative, site and manufacturer's requirements and procedures • worksite coordination requirements and procedures • site operating techniques and systems • monitoring systems and alarms requirements and procedures • ground preparation requirements and procedures • inspection, fault finding and reporting requirements and

	procedures • routine operator servicing, maintenance and housekeeping requirements and procedures • site environmental and heritage requirements and constraints • dust suppression techniques • drill system characteristics, technical capability and limitations
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures • interpret legislative requirements and procedures • interpret site requirements and procedures • interpret manufacturer's requirements and procedures • interpret work requirements • interpret geological and survey data • identify worksite hazards and response procedures • read and interpret plans, reports, maps and specifications • interpret equipment technical information • organize work tasks • apply drilling techniques • apply maintenance and house keeping requirements and procedures • operate and maintain drilling and ancillary equipment • use communications equipment • maintain records • prepare reports • work in a team • carrying out relevant calculations, which may include; addition, subtraction, multiplication, division • use appropriate instruments to measure volume, mass and length
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level II	
Unit Title	**Prepare and Perform Manual Scaling Operations**
Unit Code	**MIN UGM2 03 0114**
Unit Descriptor	This unit covers the preparation and performance of manual scaling operations in the mining industry. It includes planning and preparing for manual scaling, performing manual scaling operations, and conducting housekeeping activities.

Elements	Performance Criteria
1. Plan and prepare for manual scaling	1.1. ***Compliance documentation*** relevant to the work activity is accessed, interpreted and applied. 1.2. Work is planned and prepared. 1.3. ***Shift change-over details*** including ground conditions are received, interpreted and clarified. 1.4. Personal protective equipment appropriate for work activities is selected. 1.5. Scaling and ***ancillary equipment*** appropriate to the task is selected. 1.6.Ensure work area is ***ventilated***.
2. Perform manual scaling operations	2.1 Equipment is ensured to be safe and ready for use. 2.2 ***Hazards*** are identified and/or reported. 2.3 ***Exclusion zone*** is established to prevent unauthorized access. 2.4 A ***suitable working posture*** is maintained for manual scaling. 2.5 Maintenance of safe egress is ensured. 2.6 Manual scaling is conducted according to site procedures. 2.7 ***Services*** are maintained. 2.8 ***Dust controls*** are maintained as manual scaling operations advance.
3. Conduct housekeeping activities	3.1. Ancillary equipment is cleaned and returned. 3.2. All required documentations are completed to site requirements.

Variable	Range
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Shift change-over details	May include: • ground conditions

	• hazard reports • supervisor's instructions
Ancillary equipment	May include: • lighting • hoses water / air • lifting and handling equipment • mobile equipment (e.g. support vehicles) • paint (e.g. spray cans) • power tools and hand tools • scaling bars of various lengths • recommended/required PPE • work platforms (e.g. scissor lift, basket) • ventilation equipment
Ventilated	means: • quality and quantity of air is suitable for the work environment according to site and legislative requirements.
Hazards	May include: • ground control failure • lack of ventilation or oxygen • loose material on working surface • misfires • gases • entry by unauthorized personnel • uncovered open holes • unstable ground conditions • atmospheric contaminants • unstable footing • poor housekeeping
Exclusion zone	indicators may include: • flags • tapes • witches hats • signs including: ➢ danger ➢ traffic control signs
Suitable working posture	May include: • both feet on firm footing • holding bar in correct position • maintaining balance
Services	May include: • compressed air • water • ventilation
Dust controls	May include: • mobile/fixed sprays • ventilation

	• hand watering
Inspections	May include: • visual inspection • sounding • watering • air flow • listening for rock noise (ground talking)

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills in: • the requirements, procedures and instructions for preparing and performing manual scaling operations • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of manual scaling preparation and performance • working with others to undertake and complete the preparation and performance of manual scaling that meets all of the required outcomes • consistent timely completion of manual scaling operation preparation and performance that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • environmental procedures • equipment safety requirements • ground conditions • ground control methods • inspection procedures • isolation procedures • mining legislation • emergency procedures
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures for preparation and performance of manual scaling operations • identify hazards • work safely • communicate effectively • manually handle
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level II	
Unit Title	**Conduct Crushing, Screening and Conveying Operations**
Unit Code	**MIN UGM3 04 0114**
Unit Descriptor	This unit covers the conduct of crushing operations in the mining and extractive industries. It includes the planning and preparation for operations; operating the plant; and carrying out post operational procedures.

Elements	Performance Criteria
1. Plan and prepare for operations.	1.1. ***Compliance documentation*** relevant to the conduct of crushing operations is accessed, interpreted and applied. 1.2. ***Work requirements*** are obtained, interpreted and clarified for the satisfactory completion of operations. 1.3. ***Personal protective equipment*** appropriate for work activities is selected and used. 1.4. Ensure area is well ventilated before entry. 1.5. Work area and equipment are ***inspected and prepared in*** coordination with others. 1.6. A work plan is prepared. 1.7. Appropriate type of ***auxiliary equipment*** is selected for work activities. 1.8. ***Coordination*** requirements are resolved with others at the site prior to commencing and during work activities.
2. Operate the crushing plant.	2.1. ***Pre-start***, ***start-up***, ***run and shutdown procedures*** are carried out. 2.2. The ***operating technique*** is selected and modified to appropriately meet ***changing work conditions***. 2.3. Dust suppression and extraction methods are used. 2.4. Operations are conducted, controlled and ***monitored*** within the equipment limitations, maintaining crushing efficiency and effectiveness. 2.5. Performance monitoring systems and alarms are acted on or reported. 2.6. Hazardous and emergency situations are recognized and given response. 2.7. Work is completed in accordance with the agreed plan and outcomes and within the operating capacity of the allocated equipment.
3. Operate the screening plant.	3.1. Coordination requirements are resolved with others at the site prior to commencing and during work activities.

	3.2. Pre-start, start-up and shutdown procedures are carried out 3.3. Plant is relocated (if applicable). 3.4. Plant is prepared for operation in accordance with work requirements. 3.5. The operating technique is selected and modified to appropriately meet changing work conditions. 3.6. Operations are conducted, controlled and monitored within the equipment limitations, maintaining screening efficiency and effectiveness. 3.7. Monitoring systems and alarms are acted on or reported. 3.8. Hazardous and emergency situations are recognized and given response. 3.9. Work is completed in accordance with the agreed plan and outcomes and within the operating capacity of the allocated equipment.
4. Carry out post-operational procedures.	4.1. Fault-find and report faults are inspected. 4.2. Operational maintenance**,** servicing**,** lubricating and housekeeping tasks are carried out. 4.3. Process is maintained and records and reports are passed on.

Variable	**Range**
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Work requirements	May include: • product details • nature and scope of tasks • achievement targets • operational conditions • geological data • site survey data • site layout and out of bounds areas • worksite inspection requirements • lighting conditions • plant or equipment defects • hazards and potential hazards • coordination requirements or issues

Personal protective equipment	May include: • chemical/gas detectors • eye protection (e.g. glasses) • hearing protection (e.g. ear plugs) • protection from the elements (e.g. sun block) • protective clothing (e.g. gloves, safety boots, helmet, shin guards, long sleeved shirt and trousers)) • respiratory devices • safety harness when working at heights
Inspect and prepare work area	May include: • identification of hazards • selection and implementation of control measures for the hazards identified • safeguarding site and non-site personnel by: • erection of barricades, posting of signs and following of security procedures • selection of appropriate equipment to ensure personnel safety and protection • determination of appropriate path of movement for equipment • floor, pad, access roads, ramps and bench requirements
Auxiliary equipment	May include: • gantry cranes and attachments • hand and power tools • hoses (water and air) • mobile equipment • flexi pumps • air operated tools • boulder buster
Coordination with others	May include with: • yard persons • laboratory personnel • mobile plant operators • maintenance personnel
Pre-start and start-up procedures	May include: • walk around check of the plant • checking and toping up fluid levels (including fuel) • lubrication • inspection of attachments to ensure security and identify defects • instrument and control lever checks • reporting defects and damage • follow prescribed start-up sequence • confirm plant is operational • checking interlocks • check for tags • cameras and monitors

	• monitoring and control systems • drive belts • isolations • chutes • conveyor components • pipe and flanges • pumping system • water systems • hydraulic system • lighting • suppression system • visual and audio warning devices and lights • valves
Shutdown procedures	May include: • following prescribed shutdown sequence • securing equipment
Operating techniques	May include: • feed control • crusher adjustment • working safely around other machines and personnel
Changing work conditions	May include variations in: • rock types • feed grading • feed contamination • weather conditions • day and night
Monitoring	May include the checking of: • blockages and spillages • current draw • detecting noises and smells • flow rates • missing components • oil leaks • air flows • pressures • feed rates • wear and tear • contaminants, e.g.: oil, plastic, timber, misfire explosives, metal (e.g. bucket teeth etc)

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • the requirements, procedures and instructions for conducting crushing operations • implementation of requirements, procedures and techniques for the safe, effective and efficient conducting of crushing

	operations • working with others to undertake and complete crushing operations that meet all of the required outcomes • consistent timely completion of crushing operations that safely, effectively and efficiently meets the required outcomes • knowledge of the requirements, procedures and instructions for the conducting of screening and conveying operations • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of screening and conveying operations • working with others to undertake and complete screening and conveying operations that meet all of the required outcomes • consistent timely completion of screening and conveying operations that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	Must demonstrates knowledge of: • site hazard identification and response procedures • site risk control procedures • site and equipment health and safety procedures • site environmental requirements and procedures • site quality requirements • site communication procedures • site product characteristics • site operational procedures • plant pre-start, start-up, operating and shutdown procedures and techniques • plant components functions, characteristics, technical capability and limitations • plant breakdown procedures • plant isolation procedures • site record keeping requirements • site confine space work procedures • site personal protective equipment requirements • contaminant identification • emergency procedures • crusher components • crushing principles • hazardous goods procedures and consequences of spills • repair requirements • mobile equipment operation • computer basic techniques • monitoring and control systems • spillage procedures
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures • apply operational safety requirements

	• access, interpret and apply technical information • applying the plant operating procedures • apply production and equipment records maintenance requirements • apply diagnostic techniques • use relevant hand and power tools • work wearing personal protective equipment • apply hazard identification and management requirements and procedures • complete forms • apply hazardous goods handling techniques and management • interpret reports • use lifting techniques (manual, cranes and loads) • identify and report defects • apply procedures for working at heights and depths • apply work orders/purchase requisition preparation requirements
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level II	
Unit Title	**Operate from Elevated Work Platform Underground**
Unit Code	**MIN UGM2 05 0114**
Unit Descriptor	This unit covers operation from elevated work platforms mining industries. It includes planning and preparing for operations, positioning and setting up platforms, conducting work activities from elevated platforms, carrying out operator maintenance and conducting housekeeping activities.

Elements	Performance Criteria
1. Plan and prepare for operations	1.1. ***Compliance documentation*** relevant to the work activity is applied. 1.2. Work is planned and prepared. 1.3. Shift changeover details are received and clarified. 1.4. Personal protective equipment appropriate for work activities is selected. 1.5. Appropriate type of equipment is selected according to job type and specifications to maximize efficiency and effectiveness of work activities. 1.6. Equipment ***pre-start checks*** are performed. 1.7. ***Potential risks and hazards*** are identified and reported. 1.8. ***Start-up procedures*** are carried out. 1.9. Operations are communicated with other equipment operators and personnel using approved communication methods. 1.10. Environmental issues are identified, addressed and reported. 1.11. Emergency procedures are adhered to in case of fire and/or accident. 1.12. Approved ***dust suppression and extraction methods*** are used.
2. Position and set up platform	2.1. Equipment is positioned to ensure safety of other equipment and personnel. 2.2. ***Work platform*** is stabilized to suit ***ground conditions***. 2.3. Attachments are selected and fitted.
3. Conduct work activities from elevated platform	3.1. Approved safety devices are used by ensuring safety of personnel and surrounding site. 3.2. Equipment performance is monitored using appropriate ***indicators***. 3.3. Equipment is operated safely within work environment,

	road conditions and limitations. 3.4. All required documentations are completed clearly, concisely and on time. 3.5. End of shift information is passed on to oncoming shift.
4. Carry out operator maintenance	4.1. ***Shutdown procedures*** are carried out. 4.2. ***Operator maintenance*** and service are carried out and minor adjustments made to equipment.
5. Conduct housekeeping activities	5.1. Equipment is ***cleaned*** to maintain condition of equipment and ensure safe and efficient operations. 5.2. Auxiliary service equipment is cleaned and stored.

Variable	Range
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Pre-start checks	May include: • air filter restriction indicator • cab (horn, lights, air conditioner) • cab condition (no rags in air conditioner vent, dirt around brake and accelerator pedals, seat condition, all gear secured) • cab mounts, windows (clean, emergency exit tag in place) • capacity of equipment and/or attachments • computer systems • damage to equipment • danger tags • display instrumentation and gauges (indicators, gauges, laser levels) • duration of operation • efficient and safe operating speed • engine and stop engine lights (orange and red) • engine oil to be checked before starting engine • fire suppression unit (pins in position in triggers) • fluid levels (windscreen washer tank, hydraulic oil, coolant, grease, water, engine oil, fuel, transmission) • grease lines • light positioning and cleanliness • no combustible material around exhaust • oil leaks (engine, hydraulic hoses, on ground) • fuel leaks, transmission, (engine, on ground)

	• operating limitations • personal proximity • portable fire extinguisher (bracket, gauge, hose, ease of access) • radiator top up tank • type of activities performed • tyres and rim condition • vehicle number • visual and audio warning devices and lights • water leaks (radiator, hoses) • weight and/or load limitations • wheel nuts and studs
Potential risks and hazards	• May include: • working at heights • vertical openings • bund and/or wall collapse • decline traffic • mount and dismount injuries • pot holes • road conditions • rocks • spillage • unauthorized personnel • unsafe ground • ventilation failure • visibility
Start-up procedures	May include: • safety mechanisms operational (horn, operating lights), • correct location of equipment
Dust suppression and extraction methods	May include: • mobile/fixed sprays • screens (vent doors, vent blinds) • use of water trucks • ventilation bags operational • watering down site
Work platform	May include: • basket • cherry pickers • crane box • scissor lift
Ground conditions	May include: • broken ground • dry • noise • slope of working surface • stability of ground

	• stable ground (compaction) • amount of scale • visibility • wet
Indicators	May include: • brake air pressure • brake oil temperature • computer indicators • engine oil pressure • fuel filter • parking brake • retarder • service meter • speedometer/odometer • steering filters • tachometer • torque converter oil temperature • transmission filter • voltmeter/ ammeter • water temperature
Shutdown procedures	May include: • safety mechanisms operational (horn, operating lights), • correct location of equipment • vehicle is left secured
Operator maintenance	May include: • checking fluid levels • filter changing • greasing • keeping cab clean • tightening loose fittings
Clean	May include: • degreasing • forced air • steam cleaning • vacuum • water
Environmental issues	May include: • dust • fumes • noise • water

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills in: • knowledge of the requirements, procedures and instructions for operation from elevated work platforms underground

	• implementation of requirements, procedures and techniques for the safe, effective and efficient completion of operation from elevated work platforms underground • working with others to undertake and complete operations from elevated work platform underground that meet all of the required outcomes • consistent timely operation from elevated work platforms underground that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • environmental procedures • equipment parking • equipment processes, technical capability and limitations • equipment safety requirements • isolation procedures • operational procedures and checks • site procedures • site safety requirements
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures for operating from elevated work platforms underground • direct operations • operate, maintain and clean equipment • interpret ground conditions • monitor operations • use hand and power tools
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level II	
Unit Title	**Read Plans and Specifications**
Unit Code	**MIN UGM2 06 0114**
Unit Descriptor	This unit covers the reading of plans and specifications in the mining industry. It includes: identifying types of drawings and their functions; commonly used symbols and abbreviations; locating and identifying key features on a site plan; and reading job specifications.

Elements	Performance Criteria
1. Identify types of drawings and their functions.	1.1. The main types of plans and ***drawings*** used in the industry are identified. 1.2. Quality requirements of company operations are recognized and adhered. 1.3. Environmental controls are identified from the job plans, ***specifications*** and environmental plan.
2. Recognize commonly used symbols and abbreviations.	2.1. Mining symbols and abbreviations are recognized. 2.2. Legend is located on project drawings, symbols and abbreviations.
3. Locate and identify key features on a site plan.	3.1. Orientation of the plan is achieved with the site. 3.2. ***Key features*** of the site are identified and located. 3.3. Access to site is gained and services, main features, contours and datum are identified.
4. Read job specifications.	4.1. Job specifications are identified from drawings, notes and descriptions. 4.2. Standards of work, finishes and tolerances are identified from the project specifications. 4.3. Material attributes are identified from specifications.

Variable	Range
Drawings	may include: • site plans • locality plans • cross sectional plans • longitudinal plans • drawings • specifications • illustrations • dimensions and notes
Specifications	may include: • materials and quality of work • quality assurance

	• nominated sub-contractors
	• provision of site access/facilities
	• details relating to performance including:
	  ➢ standards of work
	  ➢ tolerances
	  ➢ material types
	  ➢ characteristics
	  ➢ treatments and finishes

Key features	may include: • type of product/service • quantities • characteristics • sizes • pattern dimension • location • surfaces and compatibility

Evidence Guide	
Critical Aspects of Competency	Must demonstrate knowledge and skills of: • knowledge of the requirements, procedures and instructions for reading and interpreting of plans and specifications • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of the reading and interpreting of plans and specifications • working with others to undertake and complete the reading and interpreting of plans and specifications that meet all of the required outcomes • consistent timely completion of the reading and interpreting of plans and specifications that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • features of plans and elevations including direction, scale, key, contours, symbols and abbreviations • commonly used civil construction symbols and abbreviations • the processes for application of scales in plan preparation/interpretation • techniques for orienting/confirming the orientation of a plan • key features of formal job specifications • site and equipment safety requirements • project quality requirements • basic calculations of heights, areas, volumes and grades • civil construction terminology • drawing conventions
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures • speaking clearly and directly, listening carefully to instructions

	and information • applying teamwork to a range of situations, particularly in a safety context • solving problems such as recognizing clear discrepancies between the documents (map, plan, specifications) and the actual site and taking action to correct these • showing initiative in adapting to changing work conditions or contexts particularly when working across a variety of work areas • managing time, particularly in organizing priorities and planning work • taking responsibility for self organization of work priorities • applying mathematical skills, including basic calculations of heights, areas, volumes and grades • showing a willingness to learn and to use a range of mediums to learn • using workplace technology including the use of communication systems and the reporting/recording of results
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview/Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level II	
Unit Title	**Install Primary Ground Support**
Unit Code	**MIN UGM2 07 0114**
Unit Descriptor	This unit covers the installation of primary ground support in the mining industry. It includes planning and preparing, setting out and preparing for primary ground support, installing primary ground support, maintaining primary ground support, and cleaning up.

Elements	Performance Criteria
1. Plan and prepare	1.1. ***Compliance documentation*** relevant to the work activity is applied. 1.2. Work instructions, including plans, specifications, quality requirements and operational details are applied to the allotted task. 1.3. ***Tools and equipment*** are selected to carry out tasks consistent with the requirements of the job, checked for serviceability and any faults are rectified or reported.
2. Set out and prepare for primary ground support	2.1. Method of ground support installation is implemented in accordance with the excavation process. 2.2. Delivered materials are used for ***primary ground support***. 2.3. Primary ground support is ***installed*** in accordance with the progressive development of the excavation process. 2.4. Component parts of ground support are prepared to designed requirements.
4. Maintain primary ground support	4.1. Daily inspection of primary ground support is carried out to ensure system is secured in accordance with specifications, particularly where explosives are in use. 4.2. Faults are identified and adjustments made to ensure ground support is maintained.
5. Clean up	5.1. Work area is cleared and ***materials*** are disposed of or recycled in accordance with project environmental management plan. 5.2. Plant, tools and equipment are cleaned, checked, maintained and stored.

Variables	Range
Relevant compliance documentation	may include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Tools and	may include:

equipment	• shovels • crow bars • spanners • measuring tapes • picks • mattocks • sledge hammers • spirit levels • angle grinders • kanga hammers • tampers • oxy-acetylene equipment
Primary ground support	may include: • steel sets/rings • timber sets • pre-cast concrete segmental sections • timber lagging sections • steel spilings • steel sheeting • dry mix concrete pads • reinforced concrete beams
Install	may include: • ground stabilization to access shafts and tunnels • embankment stabilization
Materials	may include: • sets and rings • sole plates • posts/legs • headers/crowns • liner blocks and prefabricated lattice girders • sheet pilings • lagging • sheeting • pile caps • wailers • panel • box sets • longitudinal ties • sets • braces

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • knowledge of the requirements, procedures and instructions for installing primary ground support • implementation of requirements, procedures and techniques for

	the safe, effective and efficient completion of primary ground support installation • working with others to undertake and complete the installation of primary ground support that meets all of the required outcomes • consistent timely completion of primary ground support installation that safely, effectively and efficiently meets the required outcomes • installation of at least one of the following primary ground support systems to specifications: ➢ sets and rings for two projects ➢ sheet piling for one project • panel and box sets for two projects
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • site and equipment safety requirements • foundation work • primary ground support systems and their installation techniques • scaffolding and work platform installation • construction principles • processes for interpreting engineering drawings • soil, sand, rock, clay, shale, gravel and silt types and characteristics • water erosion • equipment types, characteristics, technical capabilities and limitations • operational, maintenance and basic diagnostic procedures • site isolation and traffic control responsibilities and authorities • materials safety data sheets and materials handling methods • project quality requirements • civil construction terminology • JSAs/safe work method statements
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures for installing primary ground support • organize work activities • select and use relevant tools and equipment safely • identify and report on hazards related to the worksite and work activity • communicate effectively to receive and clarify work instructions
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the workplace or in a simulated workplace setting.

Occupational Standard: Underground Mining Level II	
Unit Title	**Escape from Hazardous Situation Unaided**
Unit Code	**MIN UGM2 08 0114**
Unit Descriptor	This unit covers escaping from hazardous situation unaided in the underground mining industries. It includes: assessing and withdrawing from hazardous situations; evacuating to fresh air; reporting and debriefing.

Elements	Performance Criteria
1. Assess and withdraw from hazardous situation	1.1 ***Compliance documentation*** relevant to escaping from hazardous situation unaided is applied. 1.2 Alarms and indicators are interpreted to determine the type, ***cause*** and severity of the hazard. 1.3 Threat/danger is assessed and decided on the safest escape option and ***escape route*** in liaison with other workers in the vicinity and notify appropriate personnel as per site requirements. 1.4 If safe, withdraw from hazardous situation is selected by proceeding to escape route. 1.5 Self-contained self rescuer and/or other recommended personal protective equipment put on according to manufacturer's instructions and/or site requirements. 1.6 The need to barricade-in and wait for external aided rescue is evaluated.
2. Evacuate to fresh air	2.1 Evacuate from hazardous situation by is done the established or alternative escape route and appropriate personnel are notified as per site requirements. 2.2 Escape route markers and guidance system are followed to navigate escape route at optimum rate of travel. 2.3 The mine atmosphere and ***mine environmental conditions*** are continuously monitored, observed and responded to adverse conditions. 2.4 ***Irrespirable atmosphere*** is evaluates and located and self rescuer/breathing apparatus caches are accessed and utilized according to manufacturer's and site requirements. 2.5 Evaluate the need for, and locate and retreat to, a place of safety or build barricade/s for protection from adverse conditions. 2.6 Air/oxygen usage is monitored and rate of travel adjusted where necessary, and efficient changeover of ***self rescuer/breathing apparatus*** ensured within determined operational timeframes.

3. Report and debrief	3.1 Details of escape are provided to relevant personnel in accordance with legislation and site requirements. 3.2 The need is evaluated for voluntary counseling.

Variable	Range
Relevant compliance documentation	may include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Causes of hazards	may include: • explosion • fire • roof fall • strata • inrush • irrespirable atmosphere • Hazchem • explosives • vehicle accidents • wall collapse • underground explosion or fire • ignition • rock burst/outburst • spontaneous combustion • environmental incidents • hot and humid atmospheres • wind blast • excessive dust
Escape route markers and guidance systems	may include: • signs • rope and cone system • streamers • reflective tape • rope • conveyor belt structure • electronic guidance systems • chemical light guidance systems • reflective droppers • pipes and cables
Mine environmental conditions	may include: • temperature • humidity

	• noise • gas levels • dust and air-borne contaminants • condition of roof and sides • water/mud levels • condition of walkways/escape ways • ventilation • decreased visibility
Irrespirable atmosphere	is considered: • an atmosphere which is unsafe for a person to breathe as a result of either oxygen depletion or the presence of: ➢ toxic fumes ➢ gases ➢ contaminants
Self rescuer/breathing apparatus	may include: • self-contained closed oxygen breathing apparatus (including chemically produced oxygen) • self-contained open circuit compressed air breathing apparatus • self-contained oxygen based self rescuers

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • knowledge of the requirements, procedures and instructions for escaping from hazardous situation unaided • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of escape from hazardous situation unaided • working with others to undertake and complete escape from hazardous situation unaided that meets all of the required outcomes • consistent timely completion of procedures for escaping from hazardous situation unaided that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • legislative and site requirements for self escape • risk management processes and techniques • types and causes of hazards and incidents in underground mines • key indicators of mine incidents • relevant geological and survey data • effects of hot and humid atmospheres • location and distribution of caches • trigger points to initiate emergency response to alarms • barricades and barricading methods • location and purpose of a place of safety • orientation and navigation in mines

	• guidance systems and markers • site emergency plans • implications of lack of visibility • site communication systems • escape routes and alternative escape routes • types of adverse environmental conditions such as smoke, visibility, dust, water, and mud • basic ventilation systems • types and effects of mine gases • travel speeds • monitoring systems
Underpinning Skills	Must demonstrates skills to: • apply legislative, organization and site requirements and procedures • apply risk management processes and techniques • inspect, put on and use self rescuer/breathing apparatus • interpret and respond to adverse environmental conditions • read mine plans and orientate and navigate in mine • identify alternative escape routes • access and use self escape equipment • observe hygiene requirements • communicate effectively • observe and report mine conditions • access, interpret and apply data from monitoring systems and equipment
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level II	
Unit Title	**Conduct Pump Operations**
Unit Code	**MIN UGM2 09 0114**
Unit Descriptor	This unit covers the conduct of pump operations in the underground mining industry. It includes planning and preparing for pumping operations, pumping material, and carrying out operator maintenance.

Elements	Performance Criteria
1. Plan and prepare for pumping operations	1.1. ***Compliance documentation*** relevant to the work activity is accessed, interpreted and applied. 1.2. Work is planned and prepared. 1.3. Shift changeover details are received, interpreted and clarified. 1.4. ***Potential risks and hazards*** are identified, addressed and reported. 1.5. Personal protective equipment appropriate for work activities is selected. 1.6. Equipment ***pre-start checks*** are conducted. 1.7. ***Environmental issues*** are identified, addressed and reported. 1.8. Pumping operations are communicated with other personnel. 1.9. Emergency procedures are adhered.
2. Pump material	2.1. Start-up and shutdown procedures are carried out. 2.2. Equipment is operated within recommended speed, engine capability and limitations. 2.3. Equipment performance is monitored by utilizing appropriate ***indicators***. 2.4. Work is completed according to agreed work plan and outcomes. 2.5. Pressure and flow of material are constantly monitored.
3. Carry out operator maintenance	3.1. Visual inspection and fault finding are conducted. 3.2. Routine operational servicing is conducted to ensure peak performance of equipment. 3.3. Equipment is cleaned. 3.4. All required records and documentation are completed accurately and promptly.

Variable	Range
Relevant compliance documentation	may include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Potential risks and hazards	may include: • abandoned equipment • adjoining pit walls • adverse weather conditions (electrical storms, floods, fires) • chemicals • contaminants • equipment • fences • holes • materials • over-hanging rocks • personnel • pot holes • unsafe ground • unstable faces • vehicles
Pre-operational checks	may include: • computer systems • display instrumentation and gauges (indicators, gauges, laser levels) • pump and componentry • visual and audio warning devices and lights
Environmental issues	may include: • culturally-sensitive sites and artefacts • drainage • dust • emissions • flora and fauna • hazardous chemicals • heritage legislation • noise • runoff • spills • water quality
Indicators	may include: • computer indicators
Capacity of pump	may include: • duration of operation

	• efficient and safe operating speed • operating limitations • pressure limitations • type of activities performed
Visual inspection and fault finding	may include: • danger tags • fire suppression unit (pins in position in triggers) • light positioning and cleanliness • oil leaks • personnel proximity • portable fire extinguisher (bracket, gauge, hose, ease of access) • stress in pipelines
Equipment cleaning methods	may include: • degreasing • forced air • steam cleaning • vacuum • water
Site conditions	may include: • broken ground • day and night • degree of compaction • location of water table • slope of working surface • stable ground (compaction) amount of scale • wet and dry • working over old underground workings and voids
Materials in suspension	may include: • ore • organic solvents • contaminants • precipitates

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills in: • knowledge of the requirements, procedures and instructions for conducting pump operations • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of pump operations • working with others to undertake and complete the conduct of pump operations that meets all of the required outcomes • consistent timely completion of pump operations that safely, effectively and efficiently meets the required outcomes
Underpinning	Must demonstrate knowledge of:

Knowledge and Attitudes	• emergency procedures • environmental principles • equipment processes, technical capability and limitations • equipment safety requirements • isolation procedures • material under pressure • mine operational system • occupational health and safety procedures • operational procedures and checks • pumping operations • pumping safety requirements
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures for conducting pump operations • maintain, clean and operate equipment • identify hazards • handle hazardous goods • maintain records • monitor operations • employ safe work practices • fault finding • use communications equipment • use hand and power tools
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level II	
Unit Title	**Participate in Workplace Communication**
Unit Code	**MIN UGM2 10 0114**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to gather, interpret and convey information in response to workplace requirements.

Elements	Performance Criteria
1. Obtain and convey workplace information	1.1 Specific and relevant information is accessed from ***appropriate sources***. 1.2 Effective questioning, active listening and speaking skills are used to gather and convey information. 1.3 Appropriate ***medium*** is used to transfer information and ideas. 1.4 Appropriate non- verbal communication is used. 1.5 Appropriate lines of communication with supervisors and colleagues are identified and followed. 1.6 Defined workplace procedures for the location and ***storage*** of information are used. 1.7 Personal interaction is carried out clearly and concisely.
2. Participate in workplace meetings and discussions	2.1 Team meetings are attended on time. 2.2 Own opinions are clearly expressed and those of others are listened to without interruption. 2.3 Meeting inputs are consistent with the meeting purpose and established ***protocols***. 2.4 ***Workplace interactions*** are conducted in a courteous manner. 2.5 Questions about simple routine workplace procedures and matters concerning working conditions of employment are asked and responded to. 2.6 Meetings outcomes are interpreted and implemented.
3. Complete relevant work related documents	3.1 Range of ***forms*** relating to conditions of employment is completed accurately and legibly. 3.2 Workplace data is recorded on standard workplace forms and documents. 3.3 Basic mathematical processes are used for routine calculations. 3.4 Errors in recording information on forms/ documents are identified and properly acted upon. 3.5 Reporting requirements to supervisor are completed according to organizational guidelines.

Variable	Range
Appropriate sources	May include but not limited to: • Team members • Suppliers • Trade personnel • Local government • Industry bodies
Medium	May include but not limited to: • Memorandum • Circular • Notice • Information discussion • Follow-up or verbal instructions • Face to face communication
Storage	May include but not limited to: • Manual filing system • Computer-based filing system
Protocols	May include but not limited to: • Observing meeting • Compliance with meeting decisions • Obeying meeting instructions
Workplace interactions	May include but not limited to: • Face to face • Telephone • Electronic and two way radio • Written including electronic, memos, instruction and forms, non-verbal including gestures, signals, signs and diagrams
Forms	May include but not limited to: • Personnel forms, telephone message forms, safety reports

Evidence Guide	
Critical Aspects of Competency	Demonstrates skills and knowledge to: • Prepare written communication following standard format of the organization • Access information using communication equipment • Make use of relevant terms as an aid to transfer information effectively • Convey information effectively adopting the formal or informal communication
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • Effective communication • Different modes of communication • Written communication • Organizational policies • Communication procedures and systems • Technology relevant to the enterprise and the individual's work

	responsibilities
Underpinning Skills	Demonstrate skills to: • Follow simple spoken language • Perform routine workplace duties following simple written notices • Participate in workplace meetings and discussions • Complete work related documents • Estimate, calculate and record routine workplace measures • Do basic mathematical processes of addition, subtraction, division and multiplication • relate to people of social range in the workplace • Gather and provide information in response to workplace Requirements
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level II	
Unit Title	**Work in Team Environment**
Unit Code	**MIN UGM2 11 0114**
Unit Descriptor	This unit covers the skills, knowledge and attitudes to identify role and responsibility as a member of a team.

Elements	Performance Criteria
1. Describe team role and scope	1.1 The ***role and objective of the team*** are identified from available ***sources of information***. 1.2 Team parameters, reporting relationships and responsibilities are identified from team discussions and appropriate external sources.
2. Identify own role and responsibility within team	2.1 Individual role and responsibilities within the team environment are identified. 2.2 Roles and responsibility of other team members are identified and recognized. 2.3 Reporting relationships within team and external to team are identified.
3. Work as a team member	3.1 Effective and appropriate forms of communications used and interactions undertaken with team members who contribute to known team activities and objectives. 3.2 Effective and appropriate contributions are made to complement team activities and objectives, based on individual skills and competencies and ***workplace context***. 3.3 Protocols are observed in reporting using standard operating procedures. 3.4 Contribute to the development of team work plans based on an understanding of team's role and objectives and individual competencies of the members.

Variable	Range
Role and objective of team	May include but not limited to: • Work activities in a team environment with enterprise or specific sector • Limited discretion, initiative and judgment maybe demonstrated on the job, either individually or in a team environment
Sources of information	May include but not limited to: • Standard operating and/or other workplace procedures • Job procedures • Machine/equipment manufacturer's specifications and instructions

	• Organizational or external personnel • Client/supplier instructions • Quality standards • OHS and environmental standards
Workplace context	May include but not limited to: • Work procedures and practices • Conditions of work environments • Legislation and industrial agreements • Standard work practice including the storage, safe handling and disposal of chemicals • Safety, environmental, housekeeping and quality guidelines

Evidence Guide	
Critical aspects of competence	Demonstrates skills and knowledge to: • Operate in a team to complete workplace activity • Work effectively with others • Convey information in written or oral form • Select and use appropriate workplace language • Follow designated work plan for the job • Report outcomes
Underpinning Knowledge and Attitude	Demonstrate knowledge of: • Communication process • Team structure • Team roles • Group planning and decision making
Underpinning Skills	Demonstrate skills to: • Communicate appropriately, consistent with the culture of the workplace
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level II	
Unit Title	**Develop Business Practice**
Unit Code	**MIN UGM2 12 0114**
Unit Descriptor	This unit specifies the outcomes required to establish a business operation from a planned concept. It includes researching the feasibility of establishing a business operation, planning the setting up of the business, implementing the plan and reviewing operations once commenced.

Elements	Performance Criteria
1. Identify business opportunity	1.1 ***Business opportunities*** are investigated and identified. 1.2 Feasibility study is undertaken to determine likely ***business viability***. 1.3 Market research on product or service is undertaken. 1.4 Assistance with feasibility study of ***specialist and relevant parties*** is sought as required. 1.5 Impact of emerging or changing technology including e-commerce, on business operations is evaluated. 1.6 Practicability of business opportunity is assessed in line with perceived risks, returns sought and resources available. 1.7 Business plan is completed for operation.
2. Identify personal business skills	2.1 Financial and business skills available are identified and taken into account when business opportunities are researched. 2.2 ***Personal skills/attributes*** are assessed and matched against those perceived as necessary for a particular business opportunity. 2.3 ***Business risks*** are identified and assessed according to resources available and personal preferences.
3. Plan for establishment of business operation	3.1 Business structure and operations are determined and documented. 3.2 Procedures are developed and documented to guide operations. 3.3 Financial backing is secured for business operation. 3.4 Business legal and regulatory requirements are identified and complied. 3.5 ***Human and physical resources*** required to commence business operation are determined. 3.6 Recruitment strategies are developed and implemented.
4. Implement establishment plan	4.1 Marketing of business operation is undertaken. 4.2 Physical and human resources are obtained to implement

	business operation. 4.3 ***Operational unit*** is established to support and coordinate business operation. 4.4 Monitoring process is developed and implemented for managing operation. 4.5 ***Legal documents*** are carefully maintained and relevant records are kept and updated to ensure validity and accessibility. 4.6 Contractual procurement rights for goods and services including ***contracts with relevant people****,* negotiated and secured as required in accordance with the business plan. 4.7 Options for leasing/ownership of business premises identified and contractual arrangements are completed in accordance with the business plan.
5. Review implementation process	5.1 Review process for implementation of business operation is developed and implemented. 5.2 Improvements in business operation and associated management process are identified. 5.3 Identified improvements are implemented and monitored for effectiveness.

Variable	**Range**
Business opportunities	May include but not limited to: • expected financial viability • skills of operator • amount and types of finance available • returns expected or required by owners • likely return on investment • finance required • lifestyle issues
Business viability	May include but not limited to: • opportunities available • market competition • timing/ cyclical considerations • skills available • resources available • location and/ or premises available • risk related to a particular business opportunity, especially • in regard to Occupational Health and Safety and • environmental considerations
Specialist and relevant parties	May include but not limited to: • Chamber of commerce • Financial planners and financial institution representatives, business planning specialists and marketing specialists • accountants

	• lawyers and providers of legal advice • government agencies • industry/trade associations • online gateways • business brokers/business consultants
Personal skills/attributes	May include but not limited to: • technical and/ or specialist skills • business knowledge and skills • entrepreneurship • willingness to take risks
Business risks	May include but not limited to: • occupational health and safety and environmental • considerations • relevant legislative requirements • security of investment • market competition • security of premises/ location • supply and demand • resources available
Human and physical resources	May include but not limited to: • software and hardware • office premises • communications equipment • specialist services through outsourcing, contracting and • consultancy • staff • vehicles
Operational unit	May include but not limited to: • office location staffed with required personnel and equipped to service and support business • home-based site or other location such as leased or owned property
Legal documents	May include but not limited to: • partnership agreements, constitution documents, statutory books for companies (Register of Members, Register of Directors and Minute Books), Certificate of Incorporation, Franchise Agreements and financial documentation, appropriate software for financial records • recordkeeping including personnel, financial, taxation, OHS and environmental
Contracts with relevant people	May include but not limited to: • owners, suppliers, employees, landlords, agents, distributors, customers or any person with whom the business has, or seeks to have, a performance-based relationship

Evidence Guide	
Critical Aspects	Demonstrates skills and knowledge in:

of Competence	• that a business operation has been planned and implemented from initial research into feasibility of the business and completion of the plan, through to implementing the plan and commencing operations • the ability to evaluate the results of research and assess the likely viability and practicability of a business opportunity, taking into account the current business/market climate and resources available
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • Federal and regional government legislative requirements affecting business operations, especially in regard to Occupational Health and Safety (OHS), Equal Employment Opportunity (EEO), industrial relations and anti-discrimination • Technical or specialist skills relevant to the business operation • Financing options • Business systems and operations • Relevant marketing, management, sales and financial concepts • Methods for researching business opportunities • Principles of risk management relevant to the business • Methods of identifying relevant specialist services to complement the business • Forms and administrative systems • Services available and charges • Planning and control systems (sales, • Advertising and promotion, distribution and logistics • Financial recording systems • Legal rights and responsibilities • Record keeping duties • Operational factors relating to the business (provision of professional services, products)
Underpinning Skills	Demonstrate skills of: • Literacy skills to interpret legal requirements, company policies and procedures and immediate, day-to-day demands • Marketing skills • Business planning skills • Entrepreneurial skills • Problem-solving skills • OHS skills • Time management skills • Belief in services and products offered by the business • Communication skills including questioning, clarifying, reporting, and giving and receiving constructive feedback • Technical and analytical skills to interpret business documents, reports and financial statements and projections • Ability to relate to people from a range of social, cultural and ethnic backgrounds and physical and mental abilities • Problem solving skills to develop contingency plans

	• Using computers and software packages to record and manage data and to produce reports • Literacy skills to enable interpretation of business information, numeracy skills for data analysis to aid research • Research skills to identify a business opportunity and to conduct a feasibility study • Analytical skills to assess personal attributes and to identify business risks • Observation skills for identifying appropriate people, resources and to monitor work
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level II	
Unit Title	**Standardize and Sustain 3S**
Unit Code	**MIN UGM2 13 0114**
Unit Descriptor	This unit of competence covers the knowledge, skills and attitudes required by worker to standardize and sustain 3S to his/her workplace. It covers responsibility for the day- to-day operations of the workplace and ensuring that continuous improvements of Kaizen elements are initiated and institutionalized.

Elements	Performance Criteria
1. Prepare for work.	1.1 Work instructions are used to determine job requirements, including method, material and equipment. 1.2 Job specifications are read and interpreted following working manual. 1.3 ***OHS requirements***, including dust and fume collection, breathing apparatus and eye and ear personal protection needs are observed throughout the work. 1.4 ***Safety equipment and tools*** are identified and checked for safe and effective operation. 1.5 ***Tools and equipment*** are prepared and used to implement 3S.
2. Standardize 3S.	2.1 Plan is prepared and used to standardize 3S activities. 2.2 ***Tools and techniques*** to standardize 3S are prepared and implemented based on ***relevant procedures***. 2.3 Checklists are followed for standardize activities and ***reported*** to ***relevant personnel***. 2.4 The workplace is kept to the specified standard. 2.5 Problems are avoided by standardizing activities.
3. Sustain 3S.	3.1 Plan is prepared and followed to standardize 3S activities. 3.2 ***Tools and techniques*** to sustain 3S are discussed, prepared and implemented based on relevant procedures. 3.3 Workplace is inspected regularly for compliance to specified standard and sustainability of 3S techniques. 3.4 Workplace is cleaned up after completion of job and before commencing next job or end of shift. 3.5 Situations are identified where compliance to standards is unlikely and actions specified in procedures are taken. 3.6 Improvements are recommended to lift the level of compliance in the workplace. 3.7 Checklists are followed to sustain activities and reported to

	relevant personnel. 3.8 Problems are avoided by sustaining activities.

Variable	Range
OHS requirements	May include but not limited to: • Are to be in accordance with legislation/ regulations/codes of practice and enterprise safety policies and procedures. This may include protective clothing and equipment, use of tooling and equipment, workplace environment and safety, handling of material, use of fire fighting equipment, enterprise first aid, hazard control and hazardous materials and substances. • Personal protective equipment is to include that prescribed under legislation/regulations/codes of practice and workplace policies and practices. • Safe operating procedures are to include, but are not limited to the conduct of operational risk assessment and treatments associated with workplace organization. • Emergency procedures related to this unit are to include but may not be limited to emergency shutdown and stopping of equipment, extinguishing fires, enterprise first aid requirements and site evacuation.
Safety equipment and tools	May include but not limited to: • dust masks / goggles • glove • working cloth • first aid • safety shoes
Tools and equipment	May include but not limited to: • paint • hook • sticker • signboard • nails • shelves • chip wood • sponge • broom • pencil • shadow board/ tools board
Tools and techniques	May include but not limited to: • 5S Job Cycle Charts • Visual 5S • The Five Minute 5S • Standardization level checklist • 5S checklist • The five Whys and one How approach(5W1H)

	• Suspension • Incorporation • Use Elimination
Relevant procedures	May include but not limited to: • Assign 3S responsibilities • Integrate 3S duties into regular work duties • Check on 3S maintenance level • OHS measures such as signage, symbols / coding and labeling of workplace and equipment • Creating conditions to sustain your plans • Roles in implementation
Reporting	May include but not limited to: • verbal responses • data entry into enterprise database • brief written reports using enterprise report formats
Relevant personnel	May include but not limited to: • supervisors, managers and quality managers • administrative, laboratory and production personnel • internal/external contractors, customers and suppliers
Tools and techniques	May include but not limited to: • 5S slogans • 5S posters • 5S photo exhibits and storyboards • 5S newsletter • 5S maps • 5S pocket manuals • 5S department/benchmarking tours • 5S months • 5S audit • Awarding system • Big cleaning day • Patrolling system may include: ➢ Top management Patrol ➢ 5S Committee members and Promotion office Patrol ➢ Mutual patrol ➢ Self-patrol ➢ Checklist patrol ➢ Camera patrol

Evidence Guide	
Critical Aspects of Competence	Demonstrates skills and knowledge to: • Discuss the relationship between Kaizen elements. • Standardize and sustain 3S activities by applying appropriate tools and techniques.
Underpinning Knowledge and Attitudes	Demonstrates knowledge of: • Elements of Kaizen

	• Ways to improve Kaizen elements • Benefits of improving kaizen elements • Relationship between Kaizen elements • The fourth pillar of 5S • Benefits of standardizing and sustaining 3S • Procedures for standardizing and sustaining 3S activities • Tools and techniques to sustain 3S • Relevant Occupational Health and Safety (OHS) and environment requirements • Plan and report • Method of communication
Underpinning Skills	Demonstrates skills of: • improving Kaizen elements by applying 5S • standardizing and sustaining procedures and techniques to avoid problems • technical drawing • procedures to standardizing 3S activities • analyzing and preparing shop layout of the workplace • standardizing and sustaining checklists • preparing and implementing tools and techniques to sustain 3S • working with others • reading and interpreting documents • observing situations • solving problems by applying 5S • communication skills • preparing labels, slogans, etc. • gathering evidence by using different means • using Kaizen board properly in accordance the procedure • reporting activities and results using report formats
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

NTQF Level III

Occupational Standard: Underground Mining Level III	
Unit Title	**Apply Environmentally Sustainable Work Practices**
Unit Code	**MIN UGM3 01 0114**
Unit Descriptor	This unit describes the performance outcomes, skills and knowledge required to effectively implement environmentally sustainable work practices.

Elements	Performance Criteria
1. Identify current practices in relation to resource usage	1.1. ***Compliance documentation*** relevant to implementing and monitoring environmentally sustainable work practices is accessed, interpreted and applied. 1.2. Environmental regulations applying to the enterprise are identified. 1.3. Procedures are identified for assessing compliance with environmental/sustainability regulations.
2. Review and communicate identified improvements	2.1. Current work processes are reviewed to access information and data to assist in identifying areas for improvement. 2.2. Information is collected and organized from a range of ***sources*** to provide information/advice and tools/resources for improvement opportunities. 2.3. Input is sought from ***stakeholders***, ***key personnel and specialists***. 2.4. Proposed improvements are communicated according to site procedures.
3. Apply performance improvement strategies	3.1. Appropriate ***techniques and tools*** are sourced and used to assist in achieving efficiency targets. 3.2. Continuous improvement strategies are applied to own work area of responsibility through ***environmental and resource efficiency improvement plans***. 3.3. ***Suggestions*** and ideas about environmental and resource efficiency management from stakeholders are applied where appropriate.
4. Monitor performance	4.1. Evaluation and monitoring tools and technology are used. 4.2. Progress against efficiency targets is reported to key personnel and stakeholders. 4.3. Organizational improvement strategies are promoted.

Variable	Range
Compliance documentation	May include: • legislative, organizational and site requirements and procedures

	• manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Sources	may include: • organization specifications • regulatory sources • relevant stakeholders • resource use
Stakeholders, key personnel and specialists	may include: • individuals and groups both inside and outside the organization who have direct or indirect interest in the organization's conduct, actions, products and services, including: ➢ customers ➢ employees at all levels of the organization ➢ government ➢ investors ➢ local community ➢ other organizations ➢ suppliers • key personnel within the organization, and specialists outside the organization who may have particular technical expertise
Techniques and tools	may include: • examination of invoices from suppliers • examination of relevant information and data • measurements made under different conditions • others as appropriate to the specific industry context
Environmental and resource efficiency improvement plans	may include: • addressing environmental and resource sustainability initiatives such as environmental management systems, action plans, green office programs, surveys and audits • applying the waste management hierarchy in the workplace • determining the organization's most appropriate waste treatment including waste to landfill, recycling, re use, recoverable resources and wastewater treatment • initiating and/or maintaining appropriate organizational procedures for operational energy consumption, including stationary energy and non stationary (transport) • preventing and minimizing risks, and maximizing opportunities such as: ➢ improving resource/energy efficiency ➢ reducing emissions of greenhouse gases • reducing use of non renewable resources • referencing standards, guidelines and approaches such as: ➢ ISO 14001:1996 Environmental management systems

	life cycle analyzes ➢ supply chain management
Suggestions	may include ideas that help to: • prevent and minimize risks and maximize opportunities such as: ➢ usage of solar or renewable energies where appropriate ➢ reducing emissions of greenhouse gases ➢ reducing use of non renewable resources ➢ making more efficient use of resources, energy and water • maximizing opportunities to re use, recycle and reclaim materials • identifying strategies to offset or mitigate environmental impacts: ➢ purchasing carbon credits ➢ energy conservation ➢ reducing chemical use ➢ reducing material consumption • expressing purchasing power through the selection of suppliers with improved environmental performance e.g. purchasing renewable energy • eliminating the use of hazardous and toxic materials

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • accessing, interpreting and complying with a range of environment/sustainability legislation and procedural requirements relevant to daily responsibilities • knowledge of relevant compliance requirements within work area • accurately following organizational information to participate in and support an improved resource efficiency process and reporting as required • planning and organizing activities in relation to measuring current use and devising strategies to improve usage • developing and/or using tools such as inspection checklists, to collect and measure relevant information on organization resource consumption, within work role • identifying organizational improvements by applying efficient resource use to daily activities • knowledge of environmental and resource hazards/risks
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • change management/continuos improvement processes • best practice approaches relevant to own area of responsibility and industry • compliance requirements within work area for all relevant environmental/sustainability legislation, regulations and codes

	of practice including resource hazards/risks associated with work area, job specifications and procedures • environmental and energy efficiency issues, systems and procedures specific to industry practice • OHS issues and requirements • organizational structure and reporting channels and procedures • quality assurance systems relevant to own work area • sustainability in the workplace • terms and conditions of employment including policies and procedures, such as daily tasks, work area responsibilities, employee, supervisor and employer rights, equal opportunity.
Underpinning Skills	Must demonstrate skills to: • comply with all relevant legislation associated with job specifications and procedures • apply communication and problem solving skills to question, seek clarification and make suggestions relating to work requirements and efficiency • apply communication/consultation skills to support information flows • apply communication and teamwork skills to recognize procedures; to follow instructions; to respond to change, such as current workplace environmental/sustainability frameworks; and to support team work and participation in a sustainable organization • apply literacy, numeracy and technology skills to interpret workplace information in relation to work role, and to document and measure resource use • apply technology skills to select and use technology appropriate for a task
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level III	
Unit Title	**Apply Risk Management Processes**
Unit Code	**MIN UGM3 02 0114**
Unit Descriptor	This unit covers the application of risk management processes in resources and infrastructure industries. It includes identifying hazards; assessing and identifying unacceptable risk; identifying and recommending treatments; contributing to the implementation of treatments; and reviewing safety system documentation.

Elements	Performance Criteria
1. Identify hazards	1.1 ***Compliance documentation*** relevant to the application of ***risk management*** processes is accessed, interpreted and applied. 1.2 Work area conditions are inspected and analyzed regularly and systematically to identify potential ***hazards***. 1.3 Existing procedures are accessed, interpreted and applied to control identified hazards. 1.4 Hazards not controlled by existing procedures are identified. 1.5 The type and scope of yet to be resolved hazards and their likely impact are recognized.
2. Assess and identify unacceptable risk	2.1 The ***likelihood*** of the event happening is considered and determined. 2.2 The ***consequence*** is evaluated and determined if the event should occur. 2.3 The ***risk*** level (likelihood and consequence combined) is considered and determined. 2.4 The ***criteria*** is identified or sourced for determining the acceptability/unacceptability of the risk. 2.5 The risk is evaluates against criteria to identify if it warrants 'unacceptable risk' status and refer the findings to the appropriate person.
3. Identify and recommend controls	3.1 The range of ***controls*** which may eliminate or minimize the risk is identified. 3.2 A detailed analysis of feasible options including the identification of ***resource*** requirements is conducted. 3.3 The most appropriate control is selected for dealing with the situation.
4. Contribute to the implementation of control	4.1 Selected control is planned in detail, including the identification of resource requirements. 4.2 Authorization is gained for selected control in accordance with site requirements.

	4.3 Controls are documented and reviewed in accordance with ***site working instructions*** (or equivalent) for the job. 4.4 Procedures are applied to control recognized hazards. 4.5 Information on the control and its implementation is communicated to the relevant people.
5. Review safety system documentation	5.1 Site working instructions (or equivalent) are monitored and reviewed for adherence to compliance documentation and site requirements. 5.2 Amendments are done to the site working instructions (or equivalent) or the matter is referred to the appropriate party for follow up.

Variable	**Range**
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Risk Management	Is defined as: • the culture, processes and structures that are directed towards the effective management of potential opportunities and adverse effects
Hazards	Is defined as: • a source of potential harm or a situation with a potential to cause loss May involve: • equipment • methods/plans • people • the work environment • uncontrolled energy • changeover • nearby activities • different conditions
Likelihood	is defined as: • a qualitative description of probability and frequency
Consequence	is defined as: • The outcome of an event or situation expressed qualitatively or quantitatively, being a loss, injury, disadvantage or gain
Risk	Is defined as: • the chance of something happening that will have an impact upon objectives. It is measured in terms of consequences and likelihood

Criteria	must be determined by: • the organization's internal policy, goals and/or objectives in reference to relevant legislation
Controls	may include option type in sequence such as: • eliminating the hazard • substitution • engineering controls • administrative controls (procedures, etc) • PPE
Resources	may include: • people • finance • equipment • environment • buildings/facilities • technology • information
Site working instructions	may include: • applicable commonwealth/state/territory legislation and code of practice relating to the industry, dangerous and hazardous goods, environmental protection and safety and health • worksite safety management systems • manufacturer's documentation and handbooks • workplace operating procedures and policies • materials safety data sheet • emergency procedures • safety alert
Communications	may include: • face to face • in writing • by telephone or by other electronic means • formal • informal

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • knowledge of the requirements, procedures and instructions for applying risk management processes • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of risk management processes • working with others to undertake and complete the application of risk management processes that meets all of the required outcomes • consistent timely completion of risk management processes that safely, effectively and efficiently meets the required outcomes

Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • OHS legislation and regulations • appropriate resources and infrastructure context and language • topics or subject areas which are target for assessment and treatment • site risk management systems and their application • conventions and requirements for written communications including report writing
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures • research, analyze and apply relevant operational information • demonstrate and apply common industry terminology • interpret work procedures and processes • use effective communication skills, including questioning and active listening skills with supervisors and other employees • write reports • apply planning and organizing skills to the risk management processes • demonstrate teamwork to involve and engage the employers/supervisors in the risk management processes • apply problem solving skills to technical resources and infrastructure issues
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level III	
Unit Title	**Store, Handle and Transport Explosives**
Unit Code	**MIN UGM3 03 0114**
Unit Descriptor	This unit covers the storage, handling and transport of explosives in underground mining. It includes planning and preparing for storage; handling and transport of explosives; accessing and managing explosives storage; preparing to transport explosives: and transporting explosives.

Elements	Performance Criteria
1. Plan and prepare for storage, handling and transport of explosives	1.1. ***Compliance documentation*** relevant to the storage, handling and transport of explosives in underground mining is accessed, interpreted and applied. 1.2. ***Work instructions*** are obtained, confirmed and applied for the allocated task. 1.3. All potential ***hazards*** are identified, managed and reported. 1.4. ***Coordination requirements*** are resolved with others at the site prior to commencing and during work activities. 1.5. The ***explosives*** and accessories used for different applications are identified. 1.6. Explosives are classified according to statutory criteria. 1.7. Safe handling procedures and precautions are applied.
2. Access and manage explosives storage	2.1. Access to ***magazine*** is gained as ***authorized person***. 2.2. Compliance requirements are maintained for signage, construction, safety and security of magazines, storage limits. 2.3. Explosives and record transfers indicating type and quantity are received and dispatched together with identity of recipient. 2.4. Explosives and accessories are segregated according to type in magazines and to prevent deterioration, spoilage and spillage. 2.5. Rotation of explosives is ensured in magazine. 2.6. Access to store is restricted to authorized persons. 2.7. Stock records and report discrepancies are maintained. 2.8. Housekeeping of magazine is conducted. 2.9. All required documentation and reports are completed clearly, concisely and on time. 2.10. Information regarding explosives stock and storage is passed on.
3. Prepare to transport explosives	3.1. Orders are received and authority of recipient is confirmed to possess explosives.

	3.2. Sufficient quantities of explosives and accessories are selected according to shot plan, for safe transport. 3.3. Results of pre-start check on explosive transport vehicle are conducted and recorded and presence and operability of relevant safety equipment confirmed. 3.4. Vehicle start-up procedures are carried out. 3.5. Legibility of relevant signs on vehicles is displayed and ensured. 3.6. Vehicle is loaded in accordance with separation and segregation requirements. 3.7. Emergency procedures are adhered in case of fire and/or accident.
4. Transport explosives	4.1. Transport explosives are communicated with other equipment operators and other persons using appropriate communication methods to advice of explosive movements. 4.2. Explosives and accessories are transported separately in approved and secured containers. 4.3. Explosives and accessories are transported to designated location using ***designated route***. 4.4. Secure and ***safe driving conventions*** are applied. 4.5. Check that delivery site is suited to explosives storage and that consignment is not left unattended. 4.6. Emergency procedures are implemented to ensure safety of personnel and site. 4.7. Surplus explosives are returned to magazine. 4.8. Required documentation and reports are completed promptly.

Variable	Range
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Work instructions	• May come from briefings, handovers, plans and work orders and may be written or verbal, formal or informal and may include: • nature and scope of tasks • specifications • achievement targets • operational conditions • obtaining of authorizations required • site layout

	• designated routes • out of bounds areas • worksite inspection requirements • lighting conditions • plant or equipment defects • hazards and potential hazards • coordination requirements or issues • contamination control requirements • barricade and signage requirements
Hazards	may include: • chemical energy, including: ➢ premature explosion ➢ deterioration of explosives ➢ stored energy • working environment, including: ➢ weather conditions ➢ insufficient illumination ➢ methane ➢ coal dust ➢ NOX gases ➢ poor road or rail conditions ➢ strata conditions ➢ fire/flames/ignition sources ➢ atmospheric contaminants ➢ dust ➢ noise ➢ lack of ventilation ➢ extraneous electricity e.g. static electricity, lightning • equipment and materials, including: ➢ faulty vehicle ➢ faulty equipment ➢ electricity ➢ radio frequencies and transmitters ➢ hot exhaust system • people, including those: ➢ speeding ➢ unauthorized persons ➢ committing theft • processes and procedures, including: ➢ back injuries
Coordination requirements	may include: • explosives purchase and delivery personnel and suppliers • blasting team • supervisors • other mine personnel
Explosives and accessories	may include: • high explosives

	• packaged explosives
	• permitted explosives
	• detonators
	• detonation mechanisms including:
	  ➢ bell wire and firing lines
	  ➢ delay mechanisms
	  ➢ blasting machines or mains firing equipment
	  ➢ explosives tester
	  ➢ binding tape

Explosives	Are classified in accordance with the Ethiopian Explosives Code and a competent authority. These provide specifications for: • class divisions • segregation • compatibility • transportation requirements
Magazine	• Is a specially constructed store or container which is used exclusively for keeping explosives or pyrotechnics
Authorized person	Is a person authorized by an appropriate senior operational manager, and may include: • shot firers • magazine keepers • management • supervisors • surveyors • drivers • miners • visitors • trainees or apprentices • inspectors • maintenance staff • service personnel • tradespersons
Designated route	may include: • direct route • safest route • specified route • preferred route • alternative route
Safe driving conventions	may include observing: • speed limits • driving to road conditions • mine lighting • right of way • parking on slopes • refuelling procedures • rules at intersections

	• towing methods • mine traffic procedures • designated roads • pre-start checks • signs on roads • no tools or other equipment carried with explosives • segregated explosives • no smoking • only authorized driver

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • knowledge of the requirements, procedures and instructions for the storage, handling and transport of explosives in underground coal mining • implementation of requirements, procedures and techniques for the safe, effective and efficient storage, handling and transport of explosives in underground coal mining • working with others to undertake the storage, handling and transport of explosives in underground coal mining that meets all of the required outcomes • consistent timely completion of the storage, handling and transport of explosives in underground coal mining that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • shot plan • site security plan • handling and transporting hazardous goods requirements • OHS requirements and procedures • equipment safety requirements • emergency procedures • site operational systems, procedures and checks • manufacturer's instructions • types, characteristics and applications of explosives and accessories • explosives storage regulations and procedures • explosive transportation procedures and regulations • explosive magazine maintenance requirements • waste management requirements and procedures • equipment operational procedures, technical capability and limitations • start-up and shutdown procedures • isolation procedures • labeling requirements
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and

	procedures for the storage, handling and transport of explosives in underground coal mining • apply procedures for preparing explosives and equipment for transport • apply control requirements and procedures explosives magazine • apply explosives classification and segregation requirements • apply hazard identification processes • apply hazardous goods handling techniques • apply driving regulations and site procedures for explosives transport • apply towing requirements and procedures • apply vehicle refuelling procedures • implement emergency procedures • apply mathematical calculations using addition, subtraction, multiplication and division • apply record keeping
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level III	
Unit Title	**Support Operational Plan**
Unit Code	**MIN UGM3 04 0114**
Unit Descriptor	This unit describes the performance outcomes, skills and knowledge required to provide support for operational practices and procedures within the organization's productivity and profitability plans. This includes contributing to the operational plan, assisting in recruiting employees and acquiring resources, and monitoring and adjusting operational performance.

Elements	Performance Criteria
1. Contribute to implementation of operational plan	1.1. Details of ***resource requirements*** are collected, recorded and reported to ***relevant personnel***. 1.2. The ***operational plan*** is ensured to contribute to the achievement of the organization's performance and business plan. 1.3. ***Key performance indicators*** are identified to measure own and work team's performance. 1.4. ***Contingency planning*** is undertaken as required. 1.5. The development and presentation of proposals are supported for resource requirements as required.
2. Assist in recruiting employees and acquiring resources	2.1. Employee recruitment and/or induction are/is assisted as required, within ***the organization's policies***, ***practices and procedures***. 2.2. Physical resources and services are acquired according to the organization's policies, practices and procedures and in consultation with relevant personnel.
3. Support operations	3.1. ***Performance systems and processes*** are identified and utilized to assess team progress in achieving plans and targets. 3.2. Actual productivity and performance are compared with identified short-term budgets, targets and performance results. 3.3. Unsatisfactory performance is identified and reported to relevant personnel, to enable action to be taken to rectify the situation. 3.4. Coaching is provided to support individuals and teams to use resources effectively, economically and safely. 3.5. ***Consultation processes*** are supported for the development and/or variation of the operational plan as required. 3.6. Recommendations are presented for variation to operational

	plans to relevant personnel. 3.7. Performance systems, procedures and recording processes are followed in accordance with organization requirements.

Variables	Range
Resource requirements	May include: • purchasing or ordering of goods • stock requirements and requisitions • supply of resources.
Relevant personnel	May include: • colleagues, supervisors and managers • OHS committees and other people with specialist responsibilities • specialist resource managers • unions/employee groups • other employees.
Operational plan	May include: • organizational plans • tactical plans developed by the department or section to detail product and service performance.
Key performance indicators	May include: • measures for monitoring or evaluating the efficiency or effectiveness of a system, and which may be used to demonstrate accountability and identify areas for improvements.
Contingency planning	may refer to: • contracting or outsourcing human resource and other functions or tasks • diversification of outcomes • finding cheaper or lower quality raw materials and consumables • increasing sales or production • recycling and re-use • rental, hire purchase or alternative means of procurement of required materials, equipment and stock • restructuring of organization to reduce labor costs • risk identification, assessment and management processes • seeking further funding • strategies for reducing costs, wastage, stock or consumables • succession planning.
The organization's policies practices and procedures	May include: • organizational guidelines which govern and prescribe operational functions, such as the acquisition and management of human and physical resources • organizational culture • Standard Operating Procedures

	• undocumented practices in line with organizational operations.
Performance systems and processes	May be: • formal or informal processes within the organization, such as: ➢ Key Performance Indicators (KPIs) ➢ specified work outcomes ➢ individual and team work plans ➢ feedback arrangements • informal systems used in the place of existing organization-wide systems.
Consultation processes	May refer to: • mechanisms used to provide feedback to the work team in relation to outcomes of consultation • meetings, interviews, brainstorming sessions, email/intranet communications, newsletters or other processes and devices which ensure that all employees have the opportunity to contribute to team and individual operational plans.

Evidence Guide	
Critical Aspects of Competence+	Must demonstrate knowledge and skills of: • suggestions for variations to the operational plan • rosters and staff allocation • short-term resource acquisition planning, contingency planning and/or risk management plans • induction programs conducted • suggestions and input into management decisions related to the operational plan • records of actions taken to address day-to-day resource shortfalls.
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • principles and techniques of: ➢ short-term operational scheduling ➢ physical resources and services acquisition procedures and/or systems ➢ budget and performance figures interpretation ➢ performance monitoring within defined job role ➢ performance reporting ➢ problem identification and resolution ➢ alternative approaches to improving resource usage and eliminating resource inefficiencies and waste within defined job role • relevant legislation from all levels of government that may affect business operations, especially in regard to occupational health and safety and environmental issues, equal opportunity, industrial relations and anti-discrimination • support for individuals and teams who have difficulty in performing to the required standard.

Underpinning Skills	Must demonstrate skills of: • ability to relate to people from a range of social, cultural and ethnic backgrounds and physical and mental abilities • coaching and mentoring skills to provide support to colleagues • functional literacy skills to access and use workplace information • skills to: ➢ maintain a safe workplace and environment ➢ access and use feedback to improve operational performance ➢ prepare recommendations to improve operations ➢ access and use established systems and processes.
Resources Implication	Assessment is required to real or appropriate simulated situations, including work areas, materials and equipment, & information on workplace practices and OHS practices.
Methods of Assessment	Competency may be assessed through: • Interview / Written Test • Observation / Demonstration and Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level III	
Unit Title	**Conduct Continuous Miner Operations**
Unit Code	**MIN UGM3 05 0114**
Unit Descriptor	This unit covers conducting continuous miner operations in the mining industry. It includes: planning and preparing for operations, fitting the continuous miner, cutting and loading ore (coal), and carrying out operator maintenance.

Elements	Performance Criteria
1. Plan and prepare for operations	1.1. ***Compliance documentation*** relevant to the work activity is accessed, interpreted and applied. 1.2. ***Mine environmental***, ***geological and survey data*** required to complete the allocated work is accessed, interpreted and applied in accordance with site procedures.
2. Flit continuous miner, cut and load ore (coal)	2.1. Coordination activities are resolved with others at the site prior to commencement of, and during, the work activity. 2.2. Pre-start, start-up, shutdown and isolation procedures are carried out in accordance with manufacturer's instructions and/or site procedures. 2.3. ***Continuous miner*** is operated in accordance with manufacturer's instructions and/or site procedures to cut and load ore (coal). 2.4. Continuous miner is flitted in accordance with site procedures 2.5. Roadway/headings is/are cut to sequence and site conditions, maintaining line and level in accordance with the development plan. 2.6. Factors adversely affecting production and monitoring systems alarms are rectified or reported in accordance with site procedures. 2.7. Changing geological conditions are identified/ monitored in accordance with site procedures. 2.8. ***Hazardous and emergency situations*** are recognized in accordance with manufacturer's instructions and/or site procedures.
3. Carry out operator maintenance	3.1. ***Continuous miner*** inspections and fault finding are carried out in accordance with manufacturer's instructions and/or site requirements. 3.2. Routine operational servicing, lubrication and housekeeping tasks are carried out in accordance with manufacturer's instructions and/or site procedures and practices. 3.3. Minor maintenance to manufacturer's instructions and/or site requirements is carried out. 3.4. Operator support is provided during preparation for, and conduct of, maintenance tasks in accordance with site requirements. 3.5. Records are processed in accordance with site requirements.

Variables	Range
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Mine environmental, geological and survey data	May be in the form of: • ventilation/gas data • deputy reports • geological hazard plan • survey data • longitudinal and cross sectional survey plan
Hazards and potential hazards	may include: • outburst • gas accumulation • flash • ignition • loss of ventilation • breaking into old workings • roof and rib collapse • water • floor condition • creep
Emergency situations	may include: • roof and rib fall • fire • cable flash • injury to personnel • explosion • outbursts • inrush • frictional ignition • loss of ventilation • gas trip
Continuous miners	May be: • radio remote controlled • manually operated • single pass • dual pass
Cutting sequence information	• May include locations and marking of areas to be mined.
Operator (operational) maintenance	• Are those established and authorized for the site.

procedures	

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • the requirements, procedures and instructions for conducting continuous miner operations • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of continuous miner operations • working with others to undertake and complete the miner operations in a way that meets all of the required outcomes • consistent timely completion of continuous miner operations that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	Must demonstrate knowledge and skills of: • mine operational safety procedures • continuous miner characteristics, technical capabilities and limitations • continuous miner operational procedures • mine geology and survey data • mine and face ventilation systems • continuous miner maintenance requirements and procedures • site environmental requirements and constraints relevant to continuous miners • applying cable care and safety • mining methods (open pit, strip and others)
Underpinning Skills	Must demonstrate knowledge and skills of: • apply legislative, organization and site requirements and procedures for continuous miner operations • apply operational safety requirements • access, interpret, apply and communicate technical information • apply hand-eye coordination • interpret survey and geological data • maintain horizon • apply diagnostic and fault finding techniques • use hand tools • maintain equipment records • comply with environmental requirements • applying cable care and safety
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level III	
Unit Title	**Conduct Underground Blast Hole Drilling**
Unit Code	**MIN UGM3 06 0114**
Unit Descriptor	This unit covers conducting blast hole drilling in underground mines. It includes: planning and preparing for drilling; drilling and monitoring progress; packing-up the drill site and carrying out operator maintenance and housekeeping activities.

Elements	Performance Criteria
1. Prepare for drilling	1.1. ***Compliance documentation*** relevant to conducting blast hole drilling in underground mines is accessed, interpreted and applied. 1.2. Shift change over details including relevant geo-technical details is received, interpreted and clarified. 1.3. Appropriate personal protective equipment is selected and used. 1.4. Site conditions are inspected and assessed to determine if scaling is required and action is taken according to site requirements. 1.5. ***Pre-start checks*** are conducted to ensure ***equipment*** is safe and ready to use. 1.6. Work area ventilation is confirmed before entry into work area. 1.7. Job site is checked and possible misfires are identified and managed.
2. Drill and monitor progress	2.1. Work is conducted according to site procedures, regulations, OHS, other relevant legislation, manufacturer's specifications safely and efficiently. 2.2. ***Hazards and potential risks*** are identified, managed and reported according to ***drilling plan***. 2.3. Approved ***dust suppression and extraction*** methods are used. 2.4. Safety of driller and surrounding ***personnel*** is maintained. 2.5. Equipment is operated safely within working environment limitations and face/ground conditions. 2.6. Drill plans are interpreted then holes drilled and equipment is realigned according to drill design. 2.7. Site conditions are monitored and ***drilling techniques*** and components adjusted to maintain drilling operations. 2.8. Drilling progress is monitored by monitoring ***equipment indicators***. 2.9. Drill cuttings and sludge are removed to ensure drill hole remains clean. 2.10. Appropriate action is diagnosed and taken to manage ***drilling problems*** and advise appropriate personnel.

	2.11. Misdirected drill holes are marked. 2.12. Collar pipes or lifters are installed in readiness for charging.
3. Pack up drill site	3.1. Equipment is de-rigged. 3.2. Site is cleared of debris. 3.3. Auxiliary services are removed to allocated area. 3.4. Equipment is confirmed to be ready for transport.
4. Carry out operator maintenance	4.1. Shutdown procedures are carried out. 4.2. Minor adjustments to equipment are serviced and made. 4.3. Equipment and reports faults are inspected and equipment available for routine operational servicing is made.
5. Carry out housekeeping activities	5.1. Equipment is cleaned to maintain condition of equipment and safe and efficient operations are ensured. 5.2. Auxiliary service equipment is cleaned and stored. 5.3. All required documentations are completed clearly, concisely and on time. 5.4. End of shift information is passed to oncoming shift.

Variable	Range
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Pre-start checks	May include: • air filter restriction indicator • cab (e.g. horn, lights, air conditioner) • computer systems • display instrumentation and gauges (e.g. indicators, gauges, laser levels) • engine and stop engine lights (e.g. orange and red) • fire and suppression systems • fire extinguishers • fluid levels (e.g. windscreen washer tank, hydraulic oil, coolant, grease, water, engine oil, fuel) • visual and audio warning devices and lights • drilling equipment (e.g. drill rig booms, drifters, hydraulic hoses, drill steels, bits and couplings) • drill rig platform, steps and hand rails
Equipment	May include: • collar piping • covering devices (e.g. plugs, cones, hessian bags)

	• drill rig (e.g. electric/hydraulic, pneumatic) • drilling components (e.g. drill rods, bits, augers, down hole hammer, down hole tools) • extra lighting (e.g. flood lights) • flags • hoses • inclinometer • lifting and handling equipment • long hole extension drills • measuring tape • oils • paint (e.g. spray cans) • plates • recovery equipment • scaling bars • signs • support vehicles • tamping sticks • tapes • witches hats • recommended/required PPE
Potential hazards and risks	May include: • ground control failure • lack of ventilation • loose material on working surface • misfires • gases • entry by unauthorized personnel • uncovered open holes • unstable ground conditions • airborne dust and fibers • unstable footing • poor housekeeping • noise • rotating machinery (e.g. drill steels) • electrical hazards • airborne rock fragments • vibration from hand held equipment
Drilling plan	• access to inclines and decline depending on the complexity of the process • drive plan • equipment and resource allocations/requirements • face • geological details • verbal or written instructions • mine site details

	• services • stope
Dust suppression and extraction methods	May include: • mobile/fixed sprays • screens (e.g. vent doors, vent blinds) • use of water trucks • ventilation bags operational • watering down site
Personnel	May include: • blasters • contractors • drillers • drivers • holders of appropriate tickets • inspectors • licensed operators • maintenance staff • personnel authorized by mine management • service personnel • supervisors • surveyors • tradespersons
Drill techniques	May include: • adjustment to feed • compacting • hammer • removing debris • rotation • speed and pull force adjustments • adjustments to drill steel angle
Indicators	For proposed holes may include: • collar tubes • cones • pegs • spray painting
Drilling problems	May be: • environmental • geological (e.g. ground conditions) • mechanical (e.g. bogged)
Parts of equipment cleaned	May include: • platform • steps and hand rails (removal of oil, grease, debris)

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • the requirements, procedures and instructions for the conducting of

	underground development drilling • implementation of requirements, procedures and techniques for the safe, effective and efficient conducting of underground development drilling • working with others to undertake and complete underground development drilling that meets all of the required outcomes • consistent timely conducting of underground development drilling that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • auxiliary services procedures • cleaning procedures • down hole problems • drilling procedures • environmental procedures • equipment processes, technical capability and limitations • equipment safety requirements • geological and technical data (e.g. basic) • hazardous goods procedures (e.g. handling and transport) • inspection procedures • isolation procedures • manufacturer's specifications • mining regulations • operational procedures and checks • recovery procedures • road rules • site procedures • site safety requirements • start-up and shutdown procedures • storage procedures • towing procedures • underground mining methods (coal, metaliferous and others)
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures • maintain, clean and operate equipment • apply drilling techniques • apply driving techniques • use hand and power tools
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level III	
Unit Title	**Conduct Underground Blasting Operations**
Unit Code	**MIN UGM3 07 0114**
Unit Descriptor	This unit covers the conduct of underground blasting operations in the mining industry. It includes planning and preparing for blasting operations; supervising the storage and transport of explosives and accessories; preparing for charging and charge holes; conducting the blast; completing post-blast activities; and carrying out equipment maintenance.

Elements	Performance Criteria
1. Plan and prepare for blasting operations	1.1. ***Compliance documentation*** relevant to underground blasting operations is accessed, interpreted and applied. 1.2. Blasting Management Plan and ***blast plan requirements*** are obtained, confirmed and applied for the blasting activity. 1.3. ***Worksite is inspected*** and all potential ***hazards*** are identified, managed and reported and work area is ensured to be safe. 1.4. Vehicle, ***equipment*** and personnel ***support requirements*** are coordinated for the work. 1.5. Arrange and/or ensure ***survey of blast area*** is completed and reported to appropriate personnel and records are maintained. 1.6. ***Geological data*** required to complete the work is accessed, interpreted and applied. 1.7. ***Calculations*** are carried out to enable pattern design, loading and tying in of shots. 1.8. The ***explosives*** and ***accessories*** required for the work are identified and confirmed.
2. Supervise the store and transport explosives and accessories	2.1. Ensure explosives and accessories are safely and correctly stored in appropriate facilities. 2.2. Ensure ***inventory control*** systems are accurately and correctly maintained. 2.3. Ensure explosives and accessories are transported to blast area and segregate correctly. 2.4. Ensure that explosives are not left unattended. 2.5. Any deteriorated or out of date explosives and accessories are identified and ***disposed*** of correctly.

3. Prepare for charging	3.1. Potential hazards and risks are identified, managed and reported. 3.2. ***Blast area is secured*** in accordance with procedures and blast plan. 3.3. Access routes are established and shot area communicated to for authorized persons and vehicle. 3.4. Hole locations and any non-conforming conditions are identified in preparation for charging. 3.5. Charging equipment is set up in accordance with site procedures. 3.6. Holes are prepared for charging in accordance with blast plan.
4. Charge holes	4.1. Blast personnel are supervised during loading operations. 4.2. Holes are primed and charged in accordance with the blast plan. 4.3. Ensure blast holes are charged in accordance with loading plan and identify ***non-conforming conditions***. 4.4. Ensure blast holes are stemmed in accordance with blast plan. 4.5. The area of equipment and personnel is cleared and the blast area, including warning signs is isolated/barricaded. 4.6. Equipment and accessories are tested. 4.7. Records are maintained. 4.8. Blast monitoring is conducted.
5. Conduct the blast	5.1. ***Pre blasting procedures*** are carried out and exclusion zone is established. 5.2. Tying in is carried out in accordance with the blast plan. 5.3. All personnel are supervised within the blast area during tie-in and initiation. 5.4. ***The blast is initiated***. 5.5. Activities are carried out and recorded in accordance with the blast plan.
6. Complete post blast activities	6.1. Post blast inspection is carried out. 6.2. Firing circuits and initiation device are secured. 6.3. Blasting completed is reported to relevant personnel. 6.4. ***Post-blast coordination*** is carried out and area is declared safe for re-entry. 6.5. Site is inspected and dealt with non-conformities including

	misfires. 6.6. Surplus ***damaged and deteriorated explosives*** and detonators are identified and disposed of. 6.7. Ensure that emergency services are advised of the disposal activities in accordance with site procedures 6.8. Reports are completed.
7. Carry out equipment maintenance	7.1. Inspection and required maintenance are carried out during and after blasting operations 7.2. Maintenance records are maintained.

Variable	**Range**
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Blast plan requirements	May include: • nature and scope of tasks and achievement targets • site location and layout • location and direction of blast holes • sleeping charges • equipment required • security measures and procedures • monitoring requirements • type and quantity of explosives and • wet or dry holes • stemming material • type and quantity of explosives and accessories • initiation methods • out of bounds areas • operational conditions • coordination requirements or issues • hazards and potential hazards • waste management requirements • environmental control requirements worksite inspection requirements • barricade and signage requirements • obtaining of permits required • equipment availability and/or requirements • plant or equipment defects • transport arrangements and/or requirements • safe storage requirements

	• public relations requirements
Site inspections	May include: • positioning stemming • cleaning up • weather check • fencing/signage and access routes • marking/hole identification • inspection • measuring holes • dewatering holes
Hazards	May include: • chemical energy, including: ➢ premature explosion ➢ deterioration of explosives ➢ stored energy • working environment, including: ➢ rock stability and ventilation ➢ weather conditions ➢ insufficient illumination ➢ methane ➢ coal dust ➢ NOX gases ➢ poor road or rail conditions ➢ strata conditions ➢ fire/flames/ignition sources ➢ atmospheric contaminants ➢ dust and fumes ➢ noise • ground conditions, including: ➢ hot ground ➢ scaling ➢ lack of ventilation ➢ extraneous electricity e.g. static electricity, lightning ➢ tipping hazards ➢ debris ➢ air blast and fly ➢ lost holes ➢ radioactivity ➢ water • equipment and materials, including: ➢ faulty explosives ➢ misfires ➢ drilling into misfires ➢ premature explosion ➢ faulty vehicle ➢ faulty equipment ➢ broken detonation leads ➢ high voltage electricity

	➢ radio frequencies and transmitters ➢ hot exhaust system ➢ high air and water pressures ➢ hydraulic oil pressure • people, including: ➢ speeding ➢ unauthorized persons ➢ theft ➢ trespassers • processes and procedures, including: ➢ back injuries ➢ drilling in butts ➢ lost holes
Equipment	May include: • siren • radios • signs • vehicles approved for carrying dangerous goods and explosives • explosives mixers • pumps • plugs (to seal finished holes prior to loading) • measuring tape • cutting implements • blast monitoring systems • video camera
Support requirements	May include: • other equipment and their operators • vehicles • public and site notification
Survey of blast area	Includes: • locate position, direction and incline of blast holes • survey reports
Geological data	May include: • rock type • structures • faults • intrusions • weathering • wet and dry holes • hot ground • reactive ground • hot and reactive ground
Calculations	May include: • depth of holes • temperatures • water problems

	• pattern design • types of explosive • BCM • explosives quantity • powder factor
Explosives	May include: • high explosives • low explosives • bulk and packaged explosives • deflagrating explosives • permitted explosives • wet or dry • variable density
Accessories	May include: • primers • delays • down lines • trunk lines • lead-in lines • detonators and detonator assemblies • detonation mechanisms including: ➢ bell wire and firing lines ➢ delay mechanisms ➢ blasting machines or mains firing equipment ➢ explosives tester • binding tape • fuses and igniter cords • detonators and detonating cord • gas bags • decking • stemming • hole liner • blast monitoring equipment • firing cables / bell wire • exploders and testers • electronic firing equipment • specialist tools • initiators
Inventory control systems	May include: • types and quantities of explosives • shelf life • distribution records
Dispose of explosives	May include: • burning by the shot firers on site • detonation in a production drill hole • detonation in a controlled manner

	• return to supplier or delivery or surrender to an Explosives Inspector for destruction
Secure blast area,	May be marked or delineated by one or more of the following: • signage • windrow • bund wall • ribbon • tape • witches hats • ropes • flags or pegs • sentries • gates
Non-conforming conditions	May include: • misfires • blockages • break through • deviation • undercut • ground conditions • ventilation • water/wet holes • hot ground
Pre-blasting procedures	May include: • warnings • sentries • area clearance
Blast initiation	Systems may include: • safety fuse • detonating cord • non-electric detonator • electric detonator • electronic detonator • remote firing
Post-blast coordination	May include: • the return of unused explosives • the return of other equipment • the withdrawing sentries • removal of signs • turning off safety devices • ventilation of area • collection of environmental monitoring equipment • recording of environmental monitoring data • maintenance may include: ➢ testing of exploders ➢ servicing of mixing equipment

	➢ maintenance of hand tools ➢ operational maintenance of bulk delivery equipment
Misfires	may be caused by: • faulty explosives or accessories • damaged or deteriorated explosives or accessories • improperly assembled explosives components • inappropriate or incomplete combinations of components • operator error or inexperience • inattention to detail or ignorance • environmental influences, e.g. wet weather or poor visibility
Damaged and deteriorated explosives	May be identified by: • exudation • efflorescence • sweating • liquefaction • hardening • softening • discolouration • crystallisation • staining • damage to wrappers and carcasses • damage to containers • physical wear and tear • kinking • abrasions and cuts • crushing • loss of identification labels and markings • exposure to the elements.

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • knowledge of the requirements, procedures and instructions for conducting underground development shot firing operations • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of underground development shot firing operations • working with others to undertake and complete underground development shot firing operations that meet all of the required outcomes • consistent timely completion of underground development shot firing operations that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • explosives and safety and health legislation • risk management including application of appropriate controls to identified risks

	• site and equipment safety procedures • site emergency procedures • environmental requirements and procedures, including vibration, noise, dust and chemicals • site environmental requirements and constraints • site geological information • types, physical and technical characteristics, uses and limitations of explosives and protection measures associated with their use • initiation systems • delayed blasts • cause and management of misfires • non-conforming conditions • non-conformities • explosives disposal methods • blasting management plan requirements • site security plan requirements • site operational procedures • site underground shot firing procedures • planning processes • explosive handling, transportation and storage requirements • equipment characteristics, technical capabilities and limitations • start-up and shutdown procedures • equipment maintenance procedures • isolation and lock out procedures • analysis of site geological and survey data • selection of appropriate explosives to meet site/ground conditions • monitoring and review processes and techniques • Mining methods (coal, metalliferous and others)
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures • apply operational safety requirements • read, interpret and apply technical information • apply operational planning skills • apply work coordination skills • apply mathematical calculations using addition, subtraction, multiplication and division • apply workplace communication techniques • apply blasting preparation techniques • apply diagnostic techniques • apply explosives storage, handling and transport procedures

	• apply charging equipment operating procedures • apply hazard identify procedures • apply procedures for identifying non-conformities • apply records and reports maintenance procedures • apply environmental compliance requirements
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level III	
Unit Title	**Read and Interpret Plans and Specifications**
Unit Code	**MIN UGM3 08 0114**
Unit Descriptor	This unit covers the reading and interpreting of plans and specifications in the mining industry. It includes: identifying types of drawings and their functions; recognising amendments and commonly used symbols and abbreviations; locating and identifying key features on a site plan; and reading and interpreting job specifications.

Elements	Performance Criteria
1. Identify types of drawings and their functions	1.1. The main types of plans and ***drawings*** used in the industry are identified. 1.2. The key functions of each type of drawing are identified. 1.3. Quality requirements of company operations are recognized and adhered. 1.4. Environmental controls are identified from the job plans, specifications and environmental plan.
2. Recognize amendments	2.1. Title panel is checked to verify latest amendments to drawing. 2.2. Amendments to ***specifications*** are checked to ensure currency of information.
3. Recognize commonly used symbols and abbreviations	3.1. Civil construction symbols and abbreviations are recognized. 3.2. Legend is located and correctly interpreted on project drawings, symbols and abbreviations.
4. Locate and identify key features on a site plan	4.1. Orientation of the plan is achieved with the site. 4.2. ***Key features*** of the site are identified and located. 4.3. Access to site is gained and services, main features, contours and datum are identified.
5. Read and interpret job specifications	5.1. Job specifications are identified from drawings, notes and descriptions. 5.2. Standards of work, finishes and tolerances are identified from the project specifications. 5.3. Material attributes are identified from specifications.

Variable	Range
Drawings	May include: • site plans • locality plans • cross sectional plans

	• longitudinal plans • structural detail and specification providing illustrations and dimensions and project plans • drawings • specifications • illustrations • dimensions and notes
Specifications	May include: • materials and quality of work • quality assurance • nominated sub-contractors • provision of site access/facilities • details relating to performance including: ➢ standards of work ➢ tolerances ➢ material types ➢ characteristics ➢ treatments and finishes
Key features	May include: • type of product/service • quantities • characteristics • sizes • pattern dimension • location • surfaces and compatibility

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • the requirements, procedures and instructions for reading and interpreting of plans and specifications • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of the reading and interpreting of plans and specifications • working with others to undertake and complete the reading and interpreting of plans and specifications that meet all of the required outcomes • consistent timely completion of the reading and interpreting of plans and specifications that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • features of plans and elevations including direction, scale, key, contours, symbols and abbreviations • commonly used civil construction symbols and abbreviations • the processes for application of scales in plan preparation/interpretation

	• techniques for orienting/confirming the orientation of a plan • key features of formal job specifications • site and equipment safety requirements • project quality requirements • basic calculations of heights, areas, volumes and grades • civil construction terminology • drawing conventions • JSA's/Safe work method statement
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures • speaking clearly and directly, listening carefully to instructions and information • applying teamwork to a range of situations, particularly in a safety context • solving problems such as recognizing clear discrepancies between the documents (map, plan, specifications) and the actual site and taking action to correct these • showing initiative in adapting to changing work conditions or contexts particularly when working across a variety of work areas • managing time, particularly in organizing priorities and planning work • taking responsibility for self organization of work priorities • applying mathematical skills, including basic calculations of heights, areas, volumes and grades • showing a willingness to learn and to use a range of mediums to learn • using workplace technology including the use of communication systems and the reporting/recording of results
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level III	
Unit Title	**Apply Shot-crete Underground**
Unit Code	**MIN UGM3 09 0114**
Unit Descriptor	This unit covers the application of shot-crete in the mining industry. It includes planning and preparing for operations, applying shot-crete and conducting housekeeping activities.

Elements	Performance Criteria
1. Plan and prepare for operations	1.1 ***Compliance documentation*** relevant to the work activity is accessed, interpreted and applied. 1.2 Work is planned and prepared. 1.3 Shift changeover details are received, interpreted and clarified. 1.4 Appropriate personal protective equipment is selected. 1.5 Type of ***equipment***, safety equipment and ground control materials are selected according to job type, work plan and ***site conditions***. 1.6 Site conditions are inspected and assessed to determine if scaling is required and action taken. 1.7 Equipment pre-start checks are conducted to ensure equipment is ready for operation. 1.8 Potential risks and hazards are identified, addressed and reported. 1.9 Appropriateness of ground control mechanism is inspected and assessed to ensure safety of site. 1.10 Approved ***dust suppression equipment and/or extraction a method*** is/are used to ensure adequate ventilation to minimize the effect of gases/irritants.
2. Apply shot-crete	2.1 Targeted surface is prepared and cleaned to ensure maximum cohesion of ***shot-crete***. 2.2 Barriers are erected according to site procedures. 2.3 The creation of gases and personnel exposure to fumes is minimized according to safe shot-creting processes. 2.4 Shot-crete is selected and applied by utilizing appropriate application method according to manufacturer's guidelines and ground condition.
3. Conduct housekeeping activities	3.1 Barriers/signs are maintained after shot-creting according to site procedures. 3.2 All required documentations are completed clearly, concisely and on time.

	3.3 Equipment is cleaned to maintain condition of equipment and safe and efficient operations are ensured. 3.4 End of shift information is passed on to oncoming shift.

Variable	Range
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Equipment	May include: • power tools and hand tools (including nail guns etc) • hoses • shot-creting equipment • remote operating control box • lifting and handling equipment • lighting • support vehicles • recommended/required PPE
Site conditions	May include: • accessibility • amount of scale • ground conditions(e.g. dry, wet) • ground stability (e.g. broken, blocky, flaky, stable, compacted) • location of water table • slope of working surface • ventilation characteristics (e.g. fumes, dust) • visibility
Dust suppression equipment and/or extraction methods	May include: • mobile/fixed sprays • screens (vent doors, vent blinds) • use of water trucks • ventilation bags operational • watering down site • fans
Shot-crete	May be wet or dry and may include: • additives (drying, etc) • fibrecrete • shot-crete • gypsum

Evidence Guide	
Critical Aspects of	Must demonstrate knowledge and skills of:

Competence	• knowledge of the requirements, procedures and instructions for application of shot-crete • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of application of shot-crete • working with others to undertake and complete the application of shot-crete that meets all of the required outcomes • consistent timely completion of application of shot-crete that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • dewatering procedures and characteristics • environmental procedures • equipment safety requirements • ground control characteristics and applications • hazardous substances (handling and transport) • inspection procedures • isolation procedures • explosive identification • manufacturer's specifications • mining legislation • site operational procedures and checks • control • gas creation • shot-creting techniques • Underground mining methods (coal, metalliferous)
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures for application of shot-crete • identify hazards • monitor operations • apply hydroscaling skills to clean and remove skate prior to shot-creting • organize work tasks • report defects • perform troubleshooting
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level III	
Unit Title	**Inspect and Maintain Shafts and Structures**
Unit Code	**MIN UGM3 10 0114**
Unit Descriptor	This unit covers the inspection and minor maintenance of shafts and structures in the mining industries. It includes: preparing for shaft and structures inspection and maintenance; and conducting shaft maintenance and post-maintenance activities.

Elements	Performance Criteria
1. Prepare for shaft and structures inspection and maintenance	1.1. ***Compliance documentation*** relevant to ***shaft and structures inspection and maintenance*** is accessed, interpreted and applied. 1.2. Inspection and maintenance schedules and hazard reports are received, interpreted and clarified. 1.3. Personal protective equipment appropriate for work activities is selected. 1.4. Equipment and work area pre-start checks are performed to ensure equipment is ready for inspection and maintenance. 1.5. Records are checked for outstanding maintenance/ inspections and recorded defects to assess scope of work. 1.6. Replacement parts and service tools are identified from the servicing schedule and obtained from the appropriate stores area. 1.7. ***Potential hazards and risks*** are identified, addressed and reported. 1.8. Shaft and structures inspection and maintenance are coordinated and liaised with appropriate persons to arrange details of preparatory activities, timing and location of inspection and maintenance. 1.9. Clearance is obtained from ***winder*** driver, or established that start-up procedures have been completed, and the area is clear for operations. 1.10. Emergency contingency plans are established with winder driver and adhered to site emergency procedures. 1.11. Maintenance ***environmental issues*** are managed. 1.12. Ensure area is properly ventilated before entry into work area. 1.13. Overhead protection and guard rails are installed in accordance with site procedures.

	1.14. Appropriate tools, measuring equipment, materials and services are checked and prepared.
2. Conduct shaft maintenance	2.1. Work is conducted safely and efficiently and according to ***site procedures***. 2.2. All necessary isolations and tagging are performed. 2.3. Communication system and perform checks are established. 2.4. Shaft maintenance is communicated with winder driver and others involved in maintenance of shafts and structures to ensure clear and safe maintenance operations. 2.5. Ensure person in charge of winder has placed winder in inspection/maintenance mode, including "inching". 2.6. Inspection and maintenance work is performed from top of conveyance. 2.7. Maintenance is carried out in accordance with site procedures and/or maintenance instructions. 2.8. Inspection/maintenance is completed and any follow-up action recorded in accordance with maintenance system requirements. 2.9. All safety devices are ensured in place and any tags placed removed before shaft is returned to service. 2.10. Overhead protection and guard rails are removed 2.11. Area is ensured to be clear of foreign materials, communication equipment and tools, and meets an acceptable standard of cleanliness.
3. Conduct post-maintenance activities	3.1. All required documentations are completed. 3.2. Ensure shaft operations and structures are tested and monitored. 3.3. Appropriate personnel are advised when maintenance activities are concluded.

Variable	**Range**
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Shaft and structure inspection and	May include: • inspection of ground conditions, including ground

maintenance	movement, cracks and seepage • inspection of shaft lining including timber, concrete and steel • inspection of shaft structural steel including: buntons, brattice and guide rails, shaft services (pipes, cables etc) • inspection for unusual conditions including water leaks, air leaks • isolation of services where necessary • minor shaft maintenance such as installing missing/broken bolts and fasteners, and shaft timbers • measuring shaft dimensions
Potential hazards and risks	May include: • communication failure • falling objects • projections into the shaft • movement (convergence of equipment) • plant failure • power failure • spillage • unauthorized personnel • visibility • explosion • asphyxiation and drowning
Winding operations	Include: • winder operations in drifts, tunnels, slopes or inclines
Environmental issues	May include: • dust • water • heat • oxygen deficiency • vibration • fumes • noise • oil spills • salt build-up • flammable and noxious gases • flammable dust
Site procedures	May include: • clean up • equipment shutdown and isolation procedures • evacuation procedures • First Aid • notifying relevant authorities • permit-to-work systems • safety equipment • use of personal protective equipment

	• communication procedures (e.g. with winder operator) • portable electric apparatus procedures • fall arrestor and harness procedures • confined spaces

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • knowledge of the requirements, procedures and instructions for inspection and maintenance of shafts and structures • implementation of requirements, procedures and techniques for the safe, effective and efficient inspection and maintenance of shafts and structures • working with others to inspect and maintain shafts and structures that meet all of the required outcomes • consistent timely completion of inspection and maintenance of shafts and structures that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • shaft operations • shaft construction and infrastructure • shaft geology • the key areas of mining acts and regulations pertaining to winding • shaft installations • defects which have potential to occur in shafts and infrastructure • trip and fault procedures and other abnormal conditions • site emergency procedures • reporting and recording requirements for winder drivers, and electrical and mechanical maintenance personnel • environmental procedures associated with shaft maintenance • equipment processes that are applicable, including technical capability and limitations • energy isolation methods • operation of protective devices in shaft and winder operations • mine ventilation system • site procedures • skip and personnel cage operations • in-shaft communications methods and equipment
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures • apply standard operating practices and procedures around shafts

	• apply safe work practices • apply procedures for operating and maintaining shafts and structures • apply procedures of monitoring critical components • apply communication and reporting requirements and procedures • use hand and power tools • mining methods (coal, metalliferous and others)
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level III	
Unit Title	**Conduct Auger Miner Operations**
Unit Code	**MIN UGM3 11 0114**
Unit Descriptor	This unit covers the conduct of auger miner operations in the coal industry. It includes planning and preparing for operations, operating the auger miner, and carrying out operator maintenance. Licensing, legislative, regulatory and certification requirements that apply to this unit can vary between states, territories, and industry sectors. Relevant information must be sourced prior to application of the unit.

Elements	Performance Criteria
1. Plan and prepare for operations	1.1. ***Compliance documentation*** relevant to the work activity is accessed, interpreted and applied. 1.2. Work requirements are obtained, interpreted and clarified before proceeding. 1.3. Geological and survey data required to complete the allocated work is accessed, interpreted and applied. 1.4. ***Safety information and procedures*** are accessed and applied throughout the work.
2. Operate auger miner	2.1. Activities are coordinated with others at the site prior to commencement of, and during, the work activity. 2.2. Pre-start, start-up, park-up and shutdown procedures are carried out in accordance with manufacturer's instructions and site procedures. 2.3. ***Auger mining*** procedures are conducted, controlled and monitored. 2.4. Required ***loading method***, drive-by or other appropriate method, and position the equipment and ***haulage units*** are selected to meet this requirement. 2.5. Monitoring systems and alarms are acted or reported. 2.6. Hazardous and emergency situations are recognized. 2.7. Work is completed in accordance with the agreed plan and outcomes and within the operating capacities of the allocated equipment.
3. Carry out operator maintenance	3.1. Equipment inspections and fault-finding are carried out. 3.2. Routine operational servicing, lubrication and housekeeping tasks are carried out. 3.3. Minor maintenance is carried out. 3.4. Operator support is provided during preparation for, and conduct

	of, major maintenance tasks. 3.5. Records are processed.

Variable	Range
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Safety information and procedures	May be contained in: • legislation and regulations • relevant Ethiopian standards • management plans • OHS policy • code of practice • manufacturer's instructions • safe working procedures (or equivalent)
Auger miners	May include: • diesel • mechanical • electrical • other design
Loading methods	May include: • drive by • stockpile • single side
Haulage Units	May include: • rear dump • belly dump • road trucks
Shift details	May include: • equipment/plant identification/allocation • nature and scope of the work • working conditions • achievement targets • site lighting arrangements • defects of machine • hazards and potential hazards • coordination requirements/issues
Specific safety requirements	Are to include: • boarding and disembarking procedures • relocation procedures • shift blasting schedules • advance and retraction procedures

	• operational signal procedures

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • knowledge of the requirements, procedures and instructions for conducting auger miner operations • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of auger miner operations • working with others to undertake and complete the auger miner operations in a way that meets all of the required outcomes • consistent timely completion of auger miner operations that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • relevant statutory requirements • site mining systems and procedures • site and equipment safety procedures • auger equipment characteristics, technical capabilities and limitations • auger mining operational procedures • auger mining maintenance systems and procedures • geological and survey data • hazard identification and response procedures • site environmental requirements and constraints related to auger mining • mining methods(coal, metalliferous and others)
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures for conducting auger miner operations • apply operational safety requirements • access, interpret and apply technical information • monitor wall stability • apply hand-eye coordination • apply diagnostic techniques • use relevant hand tools • maintain equipment records • apply environmental constraints in auger mining operations • dispose of environmentally sensitive fluids and materials
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level III	
Unit Title	**Conduct Stockpile Reclaiming Operations**
Unit Code	**MIN UGM3 12 0114**
Unit Descriptor	This unit covers the conducting of stockpile reclaiming operations in mining industries. It includes: preparing for stockpile reclaim operations; operating reclaim plant and equipment; and carrying out operator maintenance.

Elements	Performance Criteria
1. Prepare for operations	1.1. ***Compliance documentation*** relevant to the conducting of stockpile reclaiming operations is accessed, interpreted and applied. 1.2. ***Work requirements*** and ***shift details*** are obtained, interpreted and clarified/confirmed before proceeding. 1.3. ***Geological and survey data*** required to complete the allocated work is accessed, interpreted and applied. 1.4. Worksite inspection is carried out and ***hazards*** or other notifiable conditions are rectified or reported. 1.5. ***Safety information and procedures*** are accessed and applied throughout the work.
2. Operate plant and equipment	2.1. ***Activities are coordinated*** with others at the site prior to commencement of, and during, the work activity. 2.2. Pre-start, start-up, park-up and shutdown procedures are carried out. 2.3. Controls are operated to reclaim materials. 2.4. Monitoring systems and alarms are acted on or reported. 2.5. Specified materials are loaded, sampled and dispatched. 2.6. ***Hazardous and emergency situations*** are recognized. 2.7. Work is completed in accordance with the agreed plan and outcomes and within the operating capacities of the allocated equipment. 2.8. ***Reporting*** is carried out and documents are completed and processed.
3. Carry out operator maintenance	3.1. ***Plant and equipment*** inspections and faultfinding are carried out. 3.2. Routine ***operational servicing***, ***lubrication and housekeeping*** tasks are carried out. 3.3. Structures and components are visually inspected for fault conditions, wear and need of repair or replacement. 3.4. Maintenance records are processed.

Variable	Range
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Work requirements	May be in the form of: • shift briefings • handover details • work orders
Shift details	May include: • nature and scope of the work • working conditions • achievement targets • site lighting arrangements • defects on equipment • hazards and potential hazards • coordination requirements/issues
Geological and survey data	May include: • safety factors relating to natural fall • grades • levels • faults • slips • strata • drainage
Hazards	May include: • spontaneous combustion • wet weather operations • electrical start-up and shutdown • belt systems fires • electrical fires • working with other equipment
Safety information and procedures	May be contained in: • legislation and regulations • relevant Ethiopian standards • management plans • OHS policy • code of practice • manufacturer's instructions • safe working procedures (or equivalent) • specific safety requirements including: ➢ boarding and disembarking procedures

	➢ identifying and confirming potential hazards ➢ relocating and operational signal procedures
Coordination activities	May include: • communication with personnel • awareness of other support plant • equipment
Hazardous and emergency situations	May include: • sinking • spoil and high wall stabilization • wet weather operation • electrical start-up and shutdown • belt system fires • electrical fires • windy and dusty conditions • working in close proximity to moving equipment and parts
Reporting and recording	May include: • control room log • computer reports • accident/incident reports • check sheets • pre-shift equipment reports/defect reports • tags • work orders
Other plant and equipment	May include: • dozers • loaders • trucks
Operator service, maintenance and housekeeping	May include: • cleaning • authorized servicing • conduct of authorized minor replacements • provision of assistance to maintenance personnel during maintenance and repair activities

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • knowledge of the requirements, procedures and instructions for conducting stockpile reclaiming operations • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of stockpile reclaiming operations • working with others to undertake and complete stockpile reclaiming operations that meets all of the required outcomes • consistent timely completion of stockpile reclaiming operations that safely, effectively and efficiently meets the required outcomes

Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • site and equipment safety requirements and procedures • stockpile management processes • reclaimer characteristics, technical capabilities and limitations • reclaimer maintenance procedures/reclaimer operating procedures • basic mineralogy related to materials quality • blending specifications and techniques • causes of and responses to spontaneous combustion (coal mining only) • environmental requirements and constraints related to reclaim operations • recording and reporting processes • impact of reclaiming operations on customer quality requirements • mining methods (open pit mining, strip mining and others)
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures • apply operational safety requirements • access, interpret and apply technical information • apply diagnostic techniques • use hand and power tools • prepare and communicate reports • apply environmental compliance requirements • apply procedures for disposal of environmentally sensitive fluids and materials • apply records maintenance requirements • apply procedures for working at heights
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level III	
Unit Title	**Conduct Skip and Cage Operations**
Unit Code	**MIN UGM3 13 0114**
Unit Descriptor	This unit covers the conduct of skip and cage operations in the resources and infrastructure industries. It includes organizing skip and cage operations, operating skip and cages, transporting ore, waste, explosives in the cage, and carrying out operator maintenance.

Elements	Performance Criteria
1. Organize skip and cage operations	1.1. ***Compliance documentation*** relevant to the work activity is accessed, interpreted and applied. 1.2. Shift changeover details are received, interpreted and clarified. 1.3. Personal protective equipment appropriate for work activities is selected. 1.4. Equipment and work area pre-start checks are performed to ensure equipment is ready for operation. 1.5. Records are checked for outstanding maintenance/inspections and defects recorded to establish the operational status of equipment and if defective take action. 1.6. ***Potential risks and hazards*** are identified, addressed and reported. 1.7. Start-up procedures, including ***checking that area is clear for operations*** are carried out. 1.8. ***Environmental issues*** are identified, addressed and reported. 1.9. Emergency procedures are adhered.
2. Operate cage	2.1 Cage is ***loaded*** within capacity and compliance with specified limits. 2.2 Skip is loaded with materials not exceeding ***capacity*** and minimizing spillage. 2.3 Operate skip safely in the working environment with regard to the site conditions. 2.4 Ensure that **l**oads in or attached to cage, are positioned and secured prior to transit. 2.5 Cage operation is communicated with relevant personnel. 2.6 Cage is operated safely in the working environment. 2.7 Skip and cage performance is monitored and managed using appropriate ***indicators*** to aid safe operations. 2.8 All required documentation is completed clearly, concisely and

	on time. 2.9 End of shift information is passed on to oncoming shift.
3. Remove blockages	3.1. Location and nature of blockage are identified and confirmed. 3.2. Skip isolation procedures and safety provisions are conducted to ensure safety of personnel prior to visual inspection and/or removal of blockage. 3.3. Blockages are removed. 3.4. Skip operations are restored.
4. Transport explosives in the cage	4.1 Explosives used on site are identified. 4.2 The segregation and separation of detonators and explosives are determined and ensured. 4.3 Blasting agents and explosives are secured and transported. 4.4 Movement of explosives and detonators is tracked and recorded.
5. Carry out operator maintenance	5.1 Cage is isolated before conducting ***operator maintenance***. 5.2 Minor adjustments are serviced and made to equipment. 5.3 Cage operations are restored.

Variable	**Range**
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Potential risks and hazards	May include: • blockages or obstructions • communication failure • oversized loads • unauthorized personnel • unsafe ground • poor visibility • explosion • asphyxiation and drowning
Checking that area is clear for operations	May include: • external damage/defects/wear • cage arresting and slack rope systems • cleanliness of cage and plats • computer systems • danger/out of service tags • display instrumentation and gauges (indicators, gauges, laser levels)

	• fire suppression unit (pins in position in triggers) • loose wheels • communication systems • lubricants • idle positioned and running • guides and shoes • plat and cage illumination • oil leaks • personnel and materials proximity to shaft • portable fire extinguisher (bracket, gauge, hose, ease of access) • cage doors • cage ropes and attachments • visual and audio warning devices and lights
Environmental issues	May include: • dust • fumes • noise • water • heat • flammable and noxious gases • flammable dust
Loads	May include: • people • automotive diesel fuel • explosives (including detonators) • consumables • drilling equipment • trackless vehicles • track vehicles • ground support materials • cement • lubricants • paints • other hazardous substances • track laying materials
Capacity of the cage	May be affected by: • efficient and safe operating speed • personnel carrying capacity • operating limitations • type of activities performed • weight and/or load limitations
Indicators	May include: • computer indicators • cage indicators

	• plat indicators • communication and signaling systems
Operator maintenance	May include: • greasing • rope adjustments • cage door adjustments • tightening loose fittings
Equipment utilized for skip operations	May include: • winding engine • bucket • cage • skip • power supplies and equipment

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • knowledge of the requirements, procedures and instructions for conducting cage operations • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of cage operations • working with others to undertake and conduct cage operations that meet all of the required outcomes • consistent timely conduct of cage operations that safely, effectively and efficiently meet the required outcomes
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • the key areas of mining acts and regulations pertaining to winding • shaft operations • shaft installations • identification of defects relevant to cage operations through inspection or observation • trip and fault procedures and abnormal conditions • site winder emergency procedures • communication system between cage and winder • recording and logging requirements for winder drivers, and electrical and mechanical maintenance personnel • isolation and permit-to-work procedures • mine ventilation system • site procedures • in-shaft communication equipment
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures for conducting cage operations • apply standard operating practices and procedures around shafts • work safely and within level of competence

	• clean equipment • grease • communicate and report • use hand and power tools
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level III	
Unit Title	**Conduct Flexible Conveyor Train (FCT) Operations**
Unit Code	**MIN UGM3 14 0114**
Unit Descriptor	This unit covers the conduct of Flexible Conveyor Train (FCT) operations in the mining industry. It includes: planning and preparing for operations, operating flexible conveyor trains, and carrying out operator maintenance.

Elements	Performance Criteria
1. Plan and prepare for operations	1.1. ***Compliance documentation*** relevant to the work activity is accessed, interpreted and applied. 1.2. ***Work requirements*** are obtained, interpreted and clarified/confirmed before proceeding. 1.3. ***Mine environmental data*** required to complete the allocated work is accessed, interpreted and applied.
2. Operate flexible conveyor train	2.1. Coordination activities are resolved with others at the site prior to commencement of, and during, the work activity. 2.2. Pre-start, start-up, shutdown and isolation procedures are carried out in accordance with manufacturer's instructions and/or site procedures. 2.3. FCT is operated in accordance with manufacturer's instructions and/or site procedures to load and transport ore (coal). 2.4. Monorails are installed/ retracted if required, in accordance with manufacturer's instructions and/or site procedures. 2.5. ***Hazardous*** and ***emergency situations*** are recognized in accordance with manufacturer's instructions and/or site procedures.
3. Carry out operator maintenance	3.1. Conveyor train inspections and fault finding are carried out in accordance with manufacturer's instructions and/or site requirements. 3.2. Routine operational servicing, lubrication and housekeeping tasks are carried out in accordance with manufacturer's instructions and/or site procedures and practices. 3.3. Minor maintenance is carried out to manufacturer's instructions and/or site requirements. 3.4. Operator support is provided during preparation for, and conduct of, maintenance tasks in accordance with site requirements. 3.5. Records are processed in accordance with site requirements.

Variables	Range
Relevant	May include:

compliance documentation	• legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Work requirements	May be in the form of: • shift briefings • handover details • work orders May include: • machines, including any defects • cutting sequences • cut cycles • essential survey data • geological conditions • essential environment information • hazards • potential hazards • coordination requirements / issues
Mine environmental, geological and survey data	May be in the form of: • ventilation/gas data • deputy reports • geological data • survey data • longitudinal and cross sectional survey plans
Hazards/potential hazards	May include: • roof, rib and floor conditions • gas accumulation • setting • cable damage
Emergency situations	May include: • roof/rib falls
Breaker line support operations	May include: • tramming / positioning/storing • setting • lowering • radio / pendant controls • cable handling • shutdown procedures
Operational procedures	may be varied depending on the number of breaker line supports used.
Coordination activities	may include those with: • shuttle car operator • cable handler • tradespersons

	• miner driver • deputy
Operator (operational) maintenance procedures	• Are those established and authorized for the site.

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • knowledge of the requirements, procedures and instructions for conducting FCT operations • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of FCT operations • working with others to undertake and complete the FCT operations in a way that meets all of the required outcomes • consistent timely completion of FCT operations that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • mine operational safety procedures • FCT operational procedures • FCT characteristics, technical capabilities and limitations • site geology and survey information • mine and face ventilation systems • FCT maintenance requirements and procedures • site environmental requirements and constraints related to FCT • mining methods (open pit, strip and others)
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures for FCT operations • apply operational safety requirements • access, interpret, apply and communicate technical information • interpret survey and geological data • apply diagnostic and fault finding techniques • use hand tools • maintain equipment records • comply with environmental requirements • apply hand-eye coordination
Resources Implication	Assessment is required to real or appropriate simulated situations, including work areas, materials and equipment, and information on workplace practices and OHS practices.
Methods of Assessment	Competency may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level III	
Unit Title	**Conduct Control Room Operations**
Unit Code	**MIN UGM3 15 0114**
Unit Descriptor	This unit covers the conduct of control room operations in the mining industries. It includes planning and preparing for control room operations, monitoring and managing operations and conducting housekeeping activities.

Elements	Performance Criteria
1. Plan and prepare for control room operations	1.1. ***Compliance documentation*** relevant to the work activity is accessed, interpreted and applied. 1.2. Work is planned and prepared. 1.3. Shift changeover details are received, interpreted and clarified. 1.4. Appropriate personal protective equipment is selected. 1.5. Computer systems and equipment pre-start checks are performed. 1.6. ***Potential risks and hazards*** are identified, addressed and reported. 1.7. ***Pre-operational checks*** and start-up procedures are carried out. 1.8. ***Environmental issues*** are identified, addressed and reported. 1.9. Emergency procedures are adhered to ensure safety of personnel, equipment and site. 1.10. Records are checked and outstanding maintenance inspections identified and identified defects recorded. 1.11. Approved ***dust suppression and extraction methods*** are used.
2. Monitor and manage operations	2.1. ***Operations are monitored and managed*** by utilizing appropriate ***indicators***. 2.2. ***Faults are managed*** according to site procedures. 2.3. Operations are communicated with equipment operators and personnel using approved communication methods. 2.4. All required documentations are completed clearly, concisely and on time. 2.5. End-of-shift information is passed on to oncoming shift.
3. Conduct housekeeping activities	3.1. Equipment is ***cleaned***. 3.2. Auxiliary service equipment is cleaned and stored.

Variable	Range
Relevant	May include:

compliance documentation	• legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Potential risks and hazards	May include: • spillage • visibility • communication failure • unauthorized personnel • control room malfunction • power failure
Pre-operational checks	May include: • all lights working • checking stop buttons • checks tags are in place • control panel operations • performing function tests • personnel listings and clearances • resetting • security control • video cameras operational and clean
Environmental issues	May include: • live overhead wires • humidity • dust
Dust suppression and extraction methods	May include: • mobile/fixed sprays • screens (vent doors, vent blinds) • use of water trucks • ventilation bags operational • watering down site
Monitor and manage operations	May include: • control fire • monitor machinery • monitor operators and equipment progress • monitor production mucking • monitor tag system • operate rock breaking • use video camera
Indicators	May include: • cameras • computer systems • surveillance system
Manage faults	May include:

	• acknowledge alarm • notify operator at site • reset alarm • restart • visual inspection
Clean	May include: • degreasing • forced air • steam cleaning • water

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • the requirements, procedures and instructions for conducting control room operations • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of control room operations • working with others to undertake and complete control room operations that meet all of the required outcomes • consistent timely completion of control room operations that safely, effectively and efficiently meet the required outcomes
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • emergency procedures • equipment processes, technical capability and limitations • equipment safety requirements • isolation procedures • monitoring procedures • OHS procedures • operational procedures and checks
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures for conducting control room operations • direct equipment operators • monitor equipment operations
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level III	
Unit Title	**Take Environmental Samples and Measurements**
Unit Code	**MIN UGM3 16 0114**
Unit Descriptor	This unit covers taking of environmental samples and measurements in mining industries. It includes: collecting environmental samples; take readings and measurements; coordinating with scientists and laboratories; maintain sampling and measurement equipment; and reporting, storing and archiving environmental data.

Elements	Performance Criteria
1. Collect environmental samples	1.1. ***Compliance documentation*** relevant to taking of environmental samples and measurements is accessed, interpreted and applied. 1.2. Environmental ***samples*** are collected as specified in environmental management system. 1.3. Sample integrity is preserved throughout collection. 1.4. Samples are placed in suitable containers and labeled accurately. 1.5. Characteristics of sampling environment, in particular any non-standard aspects are identified and recorded.
2. Take readings and measurements	2.1. ***Measurement equipment*** is set up in accordance with Ethiopian standards. 2.2. ***Measurements*** are taken in accordance with environmental management system requirements. 2.3. Accurate ***readings*** are taken and documented at time of reading to avoid error.
3. Coordinate with scientists and laboratories	3.1. Information is provided clearly and accurately. 3.2. Delivery of samples is provided for within required time constraints. 3.3. Ensure integrity of sample is maintained during packing and transport. 3.4. Receiving feedback is acted promptly upon from laboratories where environmental risk is identified.
4. Maintain sampling and measurement equipment	4.1. Equipment is maintained in specified operating condition. 4.2. Equipment is calibrated in accordance with maintenance schedule. 4.3. Minor repairs and adjustments are performed where authorized. 4.4. Equipment software is programmed accurately where

	authorized.
5. Report, store and archive environmental data	5.1. Regular reports are prepared in accordance with environmental management system. 5.2. Data is stored accurately in manual and computer systems. 5.3. Ensure data are backed up regularly.

Variable	Range
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Samples	May include: • air and airborne dust • aerosols • sediment • rock • process streams • water • ground water • soil • noise
Sampling and measurement equipment	May include: • passive air samplers • low and high volume air samplers • water pumps samplers • personal air samples • photometric dust measuring equipment • gas liquid chromatographic analytical equipment
Measurements and readings	May include: • air velocity • flow rate • composition • temperature • humidity • barometric pressure • dust concentration and composition • water velocity • flow rate • composition • temperature

Evidence Guide	
Critical Aspects	Must demonstrate knowledge and skills of:

of Competence	• knowledge of the requirements, procedures and instructions for taking environmental samples and measurements • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of environmental samples and measurements • working with others to take environmental samples and measurements that meet all of the required outcomes • consistent timely completion of environmental sampling and measurement that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • local mine operations environmental management system related to samples and measurements • methods for retaining sample integrity • common readings and measured expected • relevant company procedures and policy • sampling and measurement equipment operations • company and statutory reporting requirements
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures • apply procedures for accurate recording of data • use computers • apply databases and spreadsheets • set up measuring equipment • apply procedures for packing and transporting environmental samples • apply equipment calibration requirements and procedures • apply equipment software programming requirements and procedures • apply statistical report preparation procedures
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competency may be assessed through: • Interview / Written Test / Oral Questioning • Observation / Demonstration
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level III	
Unit Title	**Conduct Basic and Specialized Strata Control Operations**
Unit Code	**MIN UGM3 17 0114**
Unit Descriptor	This unit covers conducting specialized strata control operations in mining industries. It includes planning and preparing for work, installing and securing supports, and carrying out operator maintenance on equipment.

Elements	Performance Criteria
1. Plan and prepare for work	1.1. ***Compliance documentation*** relevant to the ***work activity*** is accessed, interpreted and applied. 1.2. ***Mine environmental***, ***geological and survey data*** required to complete the allocated work is accessed, interpreted and applied. 1.3. ***Resources required*** for the work are determined, obtained and transported to the worksite.
2. Install and secure supports	2.1. Coordination activities are resolved with others at the site prior to commencement of, and during, the work activity. 2.2. Equipment, materials and services check is carried out in accordance with the work plan, site and legislative requirements. 2.3. Pre-start, start-up, park-up and shutdown procedures on equipment/plant are carried out in accordance with manufacturer's instructions and/or site procedures. 2.4. Down roof and ribs are scaled prior to commencing operation 2.5. Holes are drilled for rib/roof bolt installation in accordance with manufacturer and/or site requirements. 2.6. Support is installed and secured in accordance with manufacturer and/or site and legislative requirements. 2.7. Changing geological conditions are identified/monitored and responded in accordance with site procedures. 2.8. ***Hazardous*** and emergency situations are recognized in accordance with manufacturer's instructions and/or site procedures.
3. Carry out operator maintenance on equipment	3.1. Equipment inspections and fault finding are carried out in accordance with manufacturer's instructions and/or site requirements. 3.2. Routine operational servicing, lubrication and housekeeping tasks are carried out in accordance with manufacturer's instructions and/or site procedures and practices. 3.3. Minor maintenance is carried out to manufacturer's

	instructions and/or site requirements. 3.4. Operator support is provided during preparation for, and conduct of, maintenance tasks in accordance with site requirements. 3.5. Records are processed in accordance with site requirements.

Variables	Range
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Work requirements	May be in the form of: • shift briefings • handover details • work orders
Mine environmental, geological and survey data	May be in the form of: • ventilation/gas data • deputy reports • geological hazard plan • longitudinal and cross sectional survey plans
Resources required	May include: • support materials • equipment/plant • power and water • personnel
Hazards and potential hazards	may include: • personal injury • limited vision • gas accumulation • roof, rib and floor conditions • falls • chemical hazards • compressed air • hydraulic pressure • dust • heat
Work instructions	May include: • nature and scope of task • next support sequence • achievement targets • survey data • geological conditions

	• defects on equipment/plant • hazards • potential hazards • coordination requirements/issues
Supports covered by this unit	May include: • cable bolts • flexibolts • mega-bolts • polyurethane injection • shotcrete • arching/square sets • cogs (timber, fibre, crib, cans) • spialling/fore poling

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • knowledge of the requirements, procedures and instructions for conducting specialized strata control operations • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of specialized strata control operations • working with others to undertake and complete the specialized strata control operations in a way that meets all of the required outcomes • consistent timely completion of specialized strata control operations that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • statutory requirements for support • site personnel and equipment safety requirements • types, uses and limitations of specialized strata control systems • equipment characteristics, technical capabilities and limitations • support installation procedures • site ventilation procedures • strata hazard identification techniques • geological and survey data • site environmental requirements and constraints related to specialized support operations • Hazchem related to support operations • Mining Methods (coal, metalliferous and others)
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures for specialized strata control operations • apply operational safety requirements

	• access, interpret and apply technical information • read and interpret mine plans • identify specialized support equipment and materials • communicate orally • coordinate team work • identify hazards • operate specialized support equipment • install specialized supports • use relevant hand tools
Resources Implication	The following resources must be provided: Workplace or fully equipped assessment location with necessary tools, equipment and consumable materials
Methods of Assessment	Competence may be assessed through: • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level III	
Unit Title	**Operate Winder for Shaft Sinking**
Unit Code	**MIN UGM3 18 0114**
Unit Descriptor	This unit covers the operation of winder for shaft sinking in the mining industries. It includes organizing for winder operations, conducting shaft sinking using manual winder, carrying out winder inspections, and conducting end-of-shift activities.

Elements	Performance Criteria
1. Organize for winder operations	1.1. ***Compliance documentation*** relevant to the work activity is accessed, interpreted and applied. 1.2. Shift changeover details are received, interpreted and clarified. 1.3. Personal protective equipment appropriate for work activities is selected. 1.4. ***Equipment*** and work area ***pre-start checks*** are performed to ensure equipment is ready for operation. 1.5. Records are checked for outstanding maintenance/inspections and recorded defects to establish the operational status of equipment and if defective take action. 1.6. ***Potential risks and hazards*** are identified, addressed and reported. 1.7. ***Start-up procedures***, including checking that area is clear for operations are carried out. 1.8. Emergency procedures are adhered. 1.9. Dust suppression and extraction methods are applied. 1.10. Control cabin is ensured environmentally and ergonomically sound.
2. Conduct shaft sinking using manual winder	2.1. Shaft sinking is communicated with relevant personnel. 2.2. Kibble is confirmed to be ready for operation. 2.3. The system, follow start-up procedures and operate winder are ***energized*** to comply with directions from the person in charge. 2.4. Winder performance is ***monitored*** and managed using appropriate ***indicators***. 2.5. Speed and movement are adjusted. 2.6. Winder (or winders) is/are operated for shaft sinking operations.

	2.7. ***Shutdown procedures*** are carried out.
3. Carry out winder inspections	3.1. Isolation of equipment is proved. 3.2. Winder and ***auxiliary equipment*** is inspected and faults/defects are reported and winder prepared for routine servicing.
4. Conduct end-of-shift	4.1. All required documentations are completed. 4.2. End of shift information is passed on and control handed over to oncoming shift. 4.3. Control room is ensured to be ***clean*** and tidy.

Variable	**Range**
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Equipment	May include: • winding engines and head frames • stages • kibble/skip/cage • power supplies and equipment • services • fans/pumps/compressors/super-sucker • shaft doors • scrolls/tipple • conveyance guide systems • crossheads
Pre-start checks	May include: • damage/defects/wear to plant and equipment (includes infrastructure) • computer systems • communications systems • winder controls • protection and emergency devices • fire suppression systems • danger/out of service tags • display instrumentation and gauges (indicators, gauges, laser levels) • lubricant/hydraulic/coolant levels • light positioning and cleanliness • personal proximity to moving plant

	• ropes • visual and audio warning devices and lights • head frame/sky shaft • shaft brace area
Potential risks and hazards	May include: • communication failure • falling objects • explosives • moving equipment • collisions • plant failure • electricity • spillage • hazardous substances • unauthorized personnel • visibility • vibration • noise • explosion • asphyxiation and drowning
Start-up procedures	May include: • pre-start inspections, checks and tests • advisory signals indicating impending movement of conveyance • carrying out test winding cycle if required • checking that equipment/system operations are normal
Energise the system	May include: • activate power supply or start diesel motor-generator • running up hydraulic/pneumatic and other auxiliary equipment • check fault indicators
Monitor	May include: • duration of operation • efficient and safe operating speed • operating limitations • type of activities performed • weight and/or load limitations
Indicators	May include: • computer indicators • personnel cage/skip indicator
Shutdown procedures	May include: • de-activating power • shutting down hydraulic/pneumatic and other auxiliary equipment

Auxiliary equipment	May include: • emergency power supplies • emergency communications systems • fans and pumps
Clean	May include: • degreasing • forced air • steam cleaning • vacuum • water • solvents • rags and cotton waste

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • the requirements, procedures and instructions for operation of winder for shaft sinking • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of operation of winder for shaft sinking • working with others to undertake and complete the operation of winder for shaft sinking that meets all of the required outcomes • consistent timely operation of winder for shaft sinking that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • the key areas of mining acts and regulations • the relevant key areas of legislated safety and health requirements pertaining to winding • winder type and systems and operations • shaft configuration and construction • shaft services and installations (pipes, cables, ladders etc) • possible defects in winder/ equipment/installations • identification of defects relevant to sinking operations through inspection or observation • daily/weekly/monthly inspection requirements and maintenance requirements and procedures for winding systems • trip and fault procedures and abnormal conditions • site winder access/authorisation procedures • site winder emergency procedures • communication system between sinking operations and winder • recording and logging requirements for winder drivers, and electrical and mechanical maintenance personnel • equipment processes, technical capability and limitations

	• isolation and permit-to work systems and procedures • primary and secondary ventilation • shaft ventilation system • site procedures • in-shaft communications equipment
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures for operation of winder for shaft sinking • operate sinking winders • operate and clean equipment • monitor shaft sinking operations • communicate and report • monitor conveyances • use hand tools
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level III	
Unit Title	**Monitor Implementation of Work Plan/Activities**
Unit Code	**MIN UGM3 19 0114**
Unit Descriptor	This unit covers competence required to oversee and monitor the quality of work operations within an enterprise. This unit may be carried out by team leaders or supervisors.

Elements	Performance Criteria
1. Monitor and improve workplace operations	1.1 Efficiency and service levels are monitored on an ongoing basis. 1.2 Operations in the workplace support overall enterprise goals and quality assurance initiatives. 1.3 Quality ***problems*** and issues are promptly identified and adjustments are made accordingly. 1.4 Procedures and systems are changed in consultation with colleagues to improve efficiency and effectiveness. 1.5 Colleagues are consulted about ways to improve efficiency and service levels.
2. Plan and organize workflow	2.1 Current workload of colleagues is accurately assessed. 2.2 Work is scheduled in a manner which enhances efficiency and customer service quality. 2.3 Work is delegated to appropriate people in accordance with principles of delegation. 2.4 Workflow is assessed against agreed objectives and timelines and colleagues are assisted in prioritisation of workload. 2.5 Input is provided to appropriate management regarding staffing needs.
3. Maintain workplace records	3.1 ***Workplace records*** are accurately completed and submitted within required timeframes. 3.2 Where appropriate completion of records is delegated and monitored prior to submission.
4. Solve problems and make decisions	4.1 Workplace problems are promptly identified and considered from an operational and customer service perspective. 4.2 Short term action is initiated to resolve the immediate problem where appropriate. 4.3 Problems are analyzed for any long term impact and potential solutions are assessed and actioned in consultation with relevant colleagues. 4.4 Where problem is raised by a team member, they are encouraged to participate in solving the problem.

	4.5 Follow up action is taken to monitor the effectiveness of solutions in the workplace.

Variables	**Range**
Problems	May include but not limited to: • difficult customer service situations • equipment breakdown/technical failure • delays and time difficulties • competence
Workplace records	May include but is not limited to: • staff records and regular performance reports

Evidence Guide	
Critical Aspects of Competence	Assessment must confirm appropriate knowledge and skills to: • ability to effectively monitor and respond to a range of common operational and service issues in the workplace • understanding of the role of staff involved in workplace monitoring • knowledge of quality assurance, principles of workflow planning, delegation and problem solving
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • roles and responsibilities in monitoring work operations • overview of leadership and management responsibilities • principles of work planning and principles of delegation • typical work organization methods appropriate to the sector • quality assurance principles and time management • problem solving and decision making processes • industrial and/or legislative issues which affect short term work organization as appropriate to industry sector
Underpinning Skills	Demonstrate skills to: • monitoring and improving workplace operations • planning and organizing workflow • maintaining workplace records
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level III	
Unit Title	**Apply Quality Control**
Unit Code	**MIN UGM3 20 0114**
Unit Descriptor	This unit covers the knowledge, attitudes and skills required in applying quality control in the workplace.

Elements	Performance Criteria
1. Implement quality standards	1.1 Agreed quality standard and procedures are acquired and confirmed. 1.2 Standard procedures are introduced to organizational staff/personnel. 1.3 Quality standard and procedures documents are provided to employees in accordance with the organization policy. 1.4 Standard procedures are revised / updated when necessary.
2. Assess quality of service delivered	2.1 Services delivered are ***quality checked*** against organization ***quality standards*** and specifications. 2.2 Service delivered are evaluated using the appropriate evaluation ***quality parameters*** and in accordance with organization standards. 2.3 Causes of any identified faults are identified and corrective actions are taken in accordance with organization policies and procedures.
3. Record information	3.1 Basic information on the quality performance is recorded in accordance with organization procedures. 3.2 Records of work quality are maintained according to the requirements of the organization.
4. Study causes of quality deviations	4.1 Causes of deviations from final outputs or services are investigated and reported in accordance with organization procedures. 4.2 Suitable preventive action is recommended based on organization quality standards and identified causes of deviation from specified quality standards of final service or output.
5. Complete documentation	5.1 Information on quality and other indicators of service performance is recorded. 5.2 All service processes and outcomes are recorded.

Variable	Range
Quality check	May include but not limited to: • Check against design / specifications • Visual inspection and Physical inspection

Quality standards	May include but not limited to: • Materials • Components • Process • Procedures
Quality parameters	May include but not limited to: • Standard Design / Specifications • Material Specification

Evidence Guide	
Critical Aspects of Competence	Assessment requires evidence that the candidate: • Check completed work continuously against organization standard • Identify and isolate faulty or poor service • Check service delivered against organization standards • Identify and apply corrective actions on the causes of identified faults or error • Record basic information regarding quality performance • Investigate causes of deviations of services against standard • Recommend suitable preventive actions
Underpinning Knowledge	Demonstrates knowledge of: • Relevant quality standards, policies and procedures • Characteristics of services • Safety environment aspects of service processes • Evaluation techniques and quality checking procedures • Workplace procedures and reporting procedures
Underpinning Skills	Demonstrates skills to: • interpret work instructions, specifications and standards appropriate to the required work or service • carry out relevant performance evaluation • maintain accurate work records • meet work specifications and requirements • communicate effectively within defined workplace procedures
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level III	
Unit Title	**Lead Workplace Communication**
Unit Code	**MIN UGM3 21 0114**
Unit Descriptor	This unit covers the knowledge, attitudes and skills needed to lead in the dissemination and discussion of information and issues in the workplace.

Elements	Performance Criteria
1. Communicate information about workplace processes	1.1 Appropriate ***communication method*** is selected. 1.2 Multiple operations involving several topics areas are communicated accordingly. 1.3 Questions are used to gain extra information. 1.4 Correct sources of information are identified. 1.5 Information is selected and organized correctly. 1.6 Verbal and written reporting is undertaken when required. 1.7 Communication skills are maintained in all situations.
2. Lead workplace discussion	2.1 Response to workplace issues is sought. 2.2 Response to workplace issues are provided immediately. 2.3 Constructive contributions are made to workplace discussions on such issues as production, quality and safety. 2.4 Goals/objectives and action plan undertaken in the workplace are communicated.
3. Identify and communicate issues arising in the workplace	3.1 Issues and problems are identified as they arise. 3.2 Information regarding problems and issues are organized coherently to ensure clear and effective communication. 3.3 Dialogue is initiated with appropriate staff/personnel. 3.4 Communication problems and issues are raised as they arise.

Variable	Range
Methods of communication	May include but not limited to: • Non-verbal gestures • Verbal • Face to face • Two-way radio • Speaking to groups • Using telephone • Written • Using Internet • Cell phone

Evidence Guide	
Critical Aspects of Competence	Demonstrates skills and knowledge to: • Deal with a range of communication/information at one time • Make constructive contributions in workplace issues • Seek workplace issues effectively • Respond to workplace issues promptly • Present information clearly and effectively written form • Use appropriate sources of information • Ask appropriate questions • Provide accurate information
Underpinning Knowledge and Attitudes	Demonstrates knowledge of: • Organization requirements for written and electronic communication methods • Effective verbal communication methods
Underpinning Skills	Demonstrates skills to: • Organize information • Understand and convey intended meaning • Participate in variety of workplace discussions • Comply with organization requirements for the use of written and electronic communication methods
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level III	
Unit Title	**Lead Small Teams**
Unit Code	**MIN UGM3 22 0114**
Unit Descriptor	This unit covers the skills, knowledge and attitudes required to determine individual and team development needs and facilitate the development of the work group.

Elements	Performance Criteria
1. Provide team leadership	1.1 ***Learning and development needs*** are systematically identified and implemented in line with ***organizational requirements***. 1.2 Learning plan to meet individual and group training and developmental needs is collaboratively developed and implemented. 1.3 Individuals are encouraged to self-evaluate performance and identify areas for improvement. 1.4 ***Feedback on performance*** of team members is collected from relevant sources and compared with established team learning process.
2. Foster individual and organizational growth	2.1 Learning and development program goals and objectives are identified to match the specific knowledge and skills requirements of Competence standards. 2.2 ***Learning delivery methods*** are appropriate to the learning goals, the learning style of participants and availability of equipment and resources. 2.3 Workplace learning opportunities and coaching/ mentoring assistance are provided to facilitate individual and team achievement of competencies. 2.4 Resources and timelines required for learning activities are identified and approved in accordance with organizational requirements.
3. Monitor and evaluate workplace learning	3.1 Feedback from individuals or teams is used to identify and implement improvements in future learning arrangements. 3.2 Outcomes and performance of individuals/teams are assessed and recorded to determine the effectiveness of development programs and the extent of additional support. 3.3 Modifications to learning plans are negotiated to improve the efficiency and effectiveness of learning. 3.4 Records and reports of competence are maintained within organizational requirement.
4. Develop team	4.1 Open communication processes to obtain and share

commitment and cooperation	information is used by team. 4.2 Decisions are reached by the team in accordance with its agreed roles and responsibilities. 4.3 Mutual concern and camaraderie are developed in the team.
5. Facilitate accomplishment of organizational goals	5.1 Team members actively participated in team activities and communication processes. 5.2 Teams members developed individual and joint responsibility for their actions. 5.3 Collaborative efforts are sustained to attain organizational goals.

Variable	Range
Learning and development needs	May include but not limited to: • Coaching, mentoring and/or supervision • Formal/informal learning program • Internal/external training provision • Work experience/exchange/opportunities • Personal study • Career planning/development • Performance appraisals • Workplace skills assessment • Recognition of prior learning
Organizational requirements	May include but not limited to: • Quality assurance and/or procedures manuals • Goals, objectives, plans, systems and processes • Legal and organizational policy/guidelines and requirements • Safety policies, procedures and programs • Confidentiality and security requirements • Business and performance plans • Ethical standards • Quality and continuous improvement processes and standards
Feedback on performance	May include but not limited to: • Formal/informal performance appraisals • Obtaining feedback from supervisors and colleagues • Obtaining feedback from clients • Personal and reflective behavior strategies • Routine and organizational methods for monitoring service delivery
Learning delivery methods	May include but not limited to: • On the job coaching or mentoring • Problem solving • Presentation/demonstration • Formal course participation • Work experience and Involvement in professional networks

	• Conference/seminar attendance and induction

Evidence Guide	
Critical Aspects of Competence	Assessment requires evidence that the candidate: • identify and implement learning opportunities for others • give and receive feedback constructively • facilitate participation of individuals in the work of the team • negotiate learning plans to improve the effectiveness of learning • prepare learning plans to match skill needs • access and designate learning opportunities
Underpinning Knowledge and Attitude	Demonstrates knowledge of: • coaching and mentoring principles • understanding how to work effectively with team members who have diverse work styles, aspirations, cultures and perspective • understanding how to facilitate team development and improvement • understanding methods and techniques for eliciting and interpreting feedback • understanding methods for identifying and prioritizing personal development opportunities and options • knowledge of career paths and competence standards in the industry
Underpinning Skills	Demonstrates skills to: • ability to read and understand a variety of texts, prepare general information and documents according to target audience; spell with accuracy; use grammar and punctuation effective relationships and conflict management • communication skills including receiving feedback and reporting, maintaining effective relationships and conflict management • planning skills to organize required resources and equipment to meet learning needs • coaching and mentoring skills to provide support to colleagues • reporting skills to organize information; assess information for relevance and accuracy; identify and elaborate on learning outcomes • facilitation skills to conduct small group training sessions • ability to relate to people from a range of social, cultural, physical and mental backgrounds
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written exam • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the workplace or in a simulated workplace setting

Occupational Standard: Underground Mining Level III	
Unit Title	**Improve Business Practice**
Unit Code	**MIN UGM3 23 0114**
Unit Descriptor	This unit covers the skills, knowledge and attitudes required in promoting, improving and growing business operations.

Elements	Performance Criteria
1. Diagnose the business	1.1 ***Data required*** for diagnosis is determined and acquired. 1.2 ***Competitive advantage*** of the business is determined from the data. 1.3 ***SWOT analysis*** of the data is undertaken.
2. Benchmark the business	2.1 Sources of relevant benchmarking data are identified. 2.2 ***Key indicators*** for benchmarking are selected in consultation with key stakeholders. 2.3 Like indicators of own practice are compared with benchmark indicators. 2.4 Areas for improvement are identified.
3. Develop plans to improve business performance	3.1 A consolidated list of required improvements is developed. 3.2 Cost-benefit ratios for required improvements are determined. 3.3 Work flow changes resulting from proposed improvements are determined. 3.4 Proposed improvements are ranked according to agreed criteria. 3.5 An action plan is developed and agreed to implement the top ranked improvements. 3.6 ***Organizational structures*** are checked to ensure they are suitable.
4. Develop marketing and promotional plans	4.1 The practice vision statement is reviewed. 4.2 Practice ***objectives*** are developed/reviewed. 4.3 Target markets are identified/refined. 4.4 ***Market research data*** is obtained. 4.5 ***Competitor analysis*** is obtained. 4.6 ***Market position*** is developed/reviewed. 4.7 ***Practice brand*** is developed. 4.8 ***Benefits*** of practice/practice products/services are identified.

	4.9 ***Promotion tools*** are selected/developed.
5. Develop business growth plans	5.1 Plans are developed to increase ***yield per existing client***. 5.2 Plans are developed to add new clients. 5.3 Proposed plans are ranked according to agreed criteria. 5.4 An action plan is developed and agreed to implement the top ranked plans. 5.5 Practice work practices are reviewed to ensure they support growth plans.
6. Implement and monitor plans	6.1 Implementation plan is developed in consultation with all relevant stakeholders. 6.2 Indicators of success of the plan are agreed. 6.3 Implementation is monitored against agreed indicators. 6.4 Implementation is adjusted as required.

Variable	**Range**
Data required	May include but not limited to: • organization capability • appropriate business structure • level of client service which can be provided • internal policies, procedures and practices • staff levels, capabilities and structure • market, market definition • market changes/market segmentation • market consolidation/fragmentation • revenue • level of commercial activity • expected revenue levels, short and long term • revenue growth rate • break even data • pricing policy • revenue assumptions • business environment • economic conditions • social factors • demographic factors • technological impacts • political/legislative/regulative impacts • competitors, competitor pricing and response to pricing • competitor marketing/branding • competitor products
Competitive advantage	May include but not limited to: • services/products

	• fees • location • timeframe
SWOT analysis	May include but not limited to: • internal strengths such as staff capability, recognized • quality • internal weaknesses such as poor morale, • under-capitalization, poor technology • external opportunities such as changing market and • economic conditions • external threats such as industry fee structures, strategic • alliances, competitor marketing
Key indicators	May include but not limited to: • salary cost and staffing • personnel productivity (particularly of principals) • profitability • fee structure • client base • size staff/principal • overhead/overhead control
Organizational structures	May include but not limited to: • Legal structure (partnership, Limited Liability Company, etc.) • organizational structure/hierarchy • reward schemes
Objectives should be 'SMART' , that:	May include but not limited to: • S: Specific • M: Measurable • A: Achievable • R: Realistic • T: Time defined
Market research data	May include but not limited to: • data about existing clients • data about possible new clients • data from internal sources • data from external sources such as: ➢ trade associations/journals ➢ Yellow Pages small business surveys ➢ libraries ➢ Internet ➢ Chamber of Commerce ➢ client surveys ➢ industry reports ➢ secondary market research • primary market research such as: ➢ telephone surveys ➢ personal interviews

	➢ mail surveys
Competitor analysis	May include but not limited to: • competitor offerings • competitor promotion strategies and activities • competitor profile in the market place
Market position	May include but not limited to: • product • the good or service provided • product mix • the core product - what is bought • the tangible product - what is perceived • the augmented product - total package of consumer • features/benefits • product differentiation from competitive products • new/changed products • Price and pricing strategies (cost plus, supply/demand, ability to pay, etc.) • Pricing objectives (profit, market penetration, etc.) • cost components • market position • distribution strategies • marketing channels • promotion • promotional strategies • target audience • communication • promotion budget
Practice brand	May include but not limited to: • practice image • practice logo/letter head/signage • phone answering protocol • facility decor • slogans • templates for communication/invoicing • style guide • writing style • AIDA (attention, interest, desire, action)
Benefits	May include but not limited to: • features as perceived by the client • benefits as perceived by the client
Promotion tools	May include but not limited to: • networking and referrals • seminars • advertising • press releases

	• publicity and sponsorship • brochures • newsletters (print and/or electronic) • websites • direct mail • telemarketing/cold calling
Yield per existing client	May include but not limited to: • raising charge out rates/fees • packaging fees • reduce discounts • sell more services to existing clients

Evidence Guide	
Critical Aspects of Competence	The candidate must be able to demonstrate: • ability to identify the key indicators of business performance • ability to identify the key market data for the business • knowledge of a wide range of available information sources • ability to acquire information not readily available within a business • ability to analyze data and determine areas of improvement • ability to negotiate required improvements to ensure implementation • ability to evaluate systems against practice requirements • and form recommendations and/or make recommendations • ability to assess the accuracy and relevance of information
Underpinning Knowledge and Attitudes	Demonstrates knowledge of: • data analysis • communication skills • computer skills to manipulate data and present information • negotiation skills • problem solving • planning skills • marketing principles • ability to acquire and interpret relevant data • current product and marketing mix • use of market intelligence • development and implementation strategies of promotion and growth plans
Underpinning Skills	Demonstrates skill in: • data analysis and manipulation • ability to acquire and interpret required data, current practice systems and structures and sources of relevant benchmarking data • applying methods of selecting relevant key benchmarking indicators • communication skills

	• working and consulting with others when developing plans for the business • planning skills, negotiation skills and problem solving • using computers to manipulate, present and distribute information
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level III	
Unit Title	**Prevent and Eliminate MUDA**
Unit Code	**MIN UGM3 24 0114**
Unit Descriptor	This unit of competence covers the knowledge, skills and attitude required by a worker to prevent and eliminate MUDA/wastes in his/her their workplace. It covers responsibility for the day-to-day operation of the work and ensures Kaizen elements are continuously improved and institutionalized.

Elements	Performance Criteria
1. Prepare for work.	1.1 Work instructions are used to determine job requirements, including method, material and equipment. 1.2 Job specifications are read and interpreted following working manual. 1.3 ***OHS requirements***, including dust and fume collection, breathing apparatus and eye and ear personal protection needs are observed throughout the work. 1.4 Appropriate material is selected for work. 1.5 ***Safety equipment and tools*** are identified and checked for safe and effective operation.
2. Identify MUDA.	2.1 Plan of MUDA identification is prepared and implemented. 2.2 Causes and effects of MUDA are discussed. 2.3 ***Tools and techniques*** are used to draw and analyze current situation of the work place. 2.4 Wastes/MUDA are identified and measured based on ***relevant procedures***. 2.5 Identified and measured wastes are reported to relevant personnel.
3. Eliminate wastes/MUDA.	3. 1. Plan of MUDA elimination is prepared and implemented. 3. 2. Necessary attitude and ***the ten basic principles for improvement*** are adopted to eliminate waste/MUDA. 3. 3. Tools and techniques are used to eliminate wastes/MUDA based on the procedures and OHS. 3. 4. Wastes/MUDA are reduced and eliminated in accordance with OHS and organizational requirements. 3. 5. Improvements gained by elimination of waste/MUDA are reported to relevant bodies.

4. Prevent occurrence of wastes/MUDA.	4.1 Plan of MUDA prevention is prepared and implemented. 4.2 Standards required for machines, operations, defining normal and abnormal conditions, clerical procedures and procurement are discussed and prepared. 4.3 Occurrences of wastes/MUDA are prevented by using ***visual and auditory control methods***. 4.4 Waste-free workplace is created using ***5W and 1H***sheet. 4.5 The completion of required operation is done in accordance with standard procedures and practices. 4.6 The updating of standard procedures and practices is facilitated. 4.7 The capability of the work team that aligns with the requirements of the procedure is ensured.

Variable	**Range**
OHS requirements	May include but not limited to: • Are to be in accordance with legislation/ regulations/codes of practice and enterprise safety policies and procedures. This may include protective clothing and equipment, use of tooling and equipment, workplace environment and safety, handling of material, use of fire fighting equipment, enterprise first aid, hazard control and hazardous materials and substances. • Personal protective equipment is to include that prescribed under legislation/regulations/codes of practice and workplace policies and practices. • Safe operating procedures are to include, but are not limited to the conduct of operational risk assessment and treatments associated with workplace organization. • Emergency procedures related to this unit are to include but may not be limited to emergency shutdown and stopping of equipment, extinguishing fires, enterprise first aid requirements and site evacuation.
Safety equipment and tools	May include but not limited to: • dust masks / goggles • glove • working cloth • first aid • safety shoes
Tools and techniques	May include but not limited to: • Plant Layout • Process flow • Other Analysis tools • Do time study by work element

	• Measure Travel distance • Take a photo of workplace • Measure Total steps • Make list of items/products, who produces them and who uses them & those in warehouses, storages etc. • Focal points to Check and find out existing problems • 5S • Layout improvement • Brainstorming • Andon • U-line • In-lining • Unification • Multi-process handling & Multi-skilled operators • A.B. control (Two point control) • Cell production line • TPM (Total Productive Maintenance)
Relevant procedures	May include but not limited to: • Make waste visible • Be conscious of the waste • Be accountable for the waste. • Measure the waste.
The ten basic principles for improvement	May include but not limited to: • Throw out all of your fixed ideas about how to do things. • Think of how the new method will work- not how it won. • Don't accept excuses. Totally deny the status quo. • Don't seek perfection. A 5o percent implementation rate is fine as long as it's done on the spot. • Correct mistakes the moment they are found. • Don't spend a lot of money on improvements. • Problems give you a chance to use your brain. • Ask "why?" at least five times until you find the ultimate cause. • Ten people's ideas are better than one person's. • Improvement knows no limits.
Visual and auditory control methods	May include but not limited to: • Red Tagging • Sign boards • Outlining • Andons • Kanban, etc.
5W and 1H	May include but not limited to: • Who • What • Where

	• When • Why • How

Evidence Guide	
Critical Aspects of Competence	Demonstrates skills and knowledge to: • discuss why wastes occur in the workplace • discuss causes and effects of wastes/MUDA in the workplace • analyze the current situation of the workplace by using appropriate tools and techniques • identify, measure, eliminate and prevent occurrence of wastes by using appropriate tools and techniques • use 5W and 1H sheet to prevent
Underpinning Knowledge and Attitudes	Demonstrates knowledge of: • Targets of customers and manufacturer/service provider • Traditional and kaizen thinking of price setting • Kaizen thinking in relation to targets of manufacturer/service provider and customer • value • The three categories of operations • the 3“MU” • waste/MUDA • wastes occur in the workplace • The 7 types of MUDA • The Benefits of identifying and eliminating waste • Causes and effects of 7 MUDA • Procedures to identify MUDA • Necessary attitude and the ten basic principles for improvement • Procedures to eliminate MUDA • Prevention of wastes • Methods of waste prevention • Definition and purpose of standardization • Standards required for machines, operations, defining normal and abnormal conditions, clerical procedures and procurement • Methods of visual and auditory control • TPM concept and its pillars. • Relevant Occupational Health and Safety (OHS) and environment requirements • Plan and report • Method of communication
Underpinning Skills	Demonstrates skills to: • draw & analyze current situation of the work place • use measurement apparatus (stop watch, tape, etc.)

	• calculate volume and area • use and follow checklists to identify, measure and eliminate wastes/MUDA • identify and measure wastes/MUDA in accordance with OHS and procedures • use tools and techniques to eliminate wastes/MUDA in accordance with OHS procedure • apply 5W and 1H sheet • update and use standard procedures for completion of required operation • work with others • read and interpret documents • observe situations • solve problems • communicate • gather evidence by using different means • report activities and results using report formats
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

NTQF Level IV

Occupational Standard: Underground Mining Level IV	
Unit Title	**Apply and Monitor Mine Operations Emergency Preparedness and Response Systems**
Unit Code	**MIN UGM4 01 0114**
Unit Descriptor	This unit covers applying and monitoring emergency preparedness and response systems in the underground coal mining operations. It includes: planning and preparing for the application of the plan; applying the plan; and applying routine plan maintenance procedures.

Elements	Performance Criteria
1. Plan and prepare for the application of the plan	1.1. ***Compliance documentation*** relevant to underground coal mine emergency preparedness and response systems is accessed, interpreted and applied. 1.2. The emergency preparedness and response plans are accessed, interpreted and explained. 1.3. Roles and responsibilities are identified and explained as specified in the emergency preparedness and response plans. 1.4. Work group and individual responsibilities and tasks are ***communicated*** and explained in an effective and timely manner. 1.5. ***Resources*** required for the application of the emergency preparedness and response plans are identified, obtained and allocated. 1.6. Individual training needs are identified.
2. Apply the plan	2.1. ***Incident*** information is received and communicated in accordance with the emergency plan. 2.2. The nature and scope of the incident are assessed and communicated in accordance with the emergency plan. 2.3. Emergency response and evacuation plans and procedures are applied and monitored in accordance with the emergency plan. 2.4. Procedures are applied for monitoring, recording and reporting on emergency incidents according to the emergency plan. 2.5. Procedures are applied for the collection, analysis and validation of ***emergency preparedness and response data***. 2.6. Contribute to the management of the situation/incident in accordance with the emergency plan.

	2.7. Action plans are applied and monitored in accordance with the emergency plans. 2.8. Incident information is communicated in accordance with the emergency plan. 2.9. Participate in ***audit*** and review requirements in accordance with the emergency plan as per site requirements.
3. Apply routine plan maintenance procedures	3.1. Inspections, equipment repair and maintenance activities are scheduled and carried out in accordance with the emergency preparedness and response plans. 3.2. Maintenance requirements / activities are recorded and reported in accordance with the emergency preparedness and response plans.

Variable	**Range**
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Communications	Can include: • radio/PED • telephone/DAC • telemetry • oral • written • computers • runners
Required services and resources	Can include, but are not limited to: • internal mine services and resources • contractors • local community • Inspectorate • police • Mines Rescue Service • fire brigades • ambulance • hospitals • critical incident stress debriefing organizations • media • district check inspector • other mines • entrapment procedures

Incidents	Can be caused by: • explosion • fire • strata failure • inrush • outburst • irrespirable atmosphere • environmental incident • hazardous chemicals • explosives • vehicle accidents • wind blast • failure of ventilation control devices/appliances
Types of incident	Can be identified as: • minor accident • major accident or fatality • underground explosion • fire • ignition • spontaneous combustion • surface fire which disrupts operations • environmental incidents • bomb threat • terrorist attack • high potential incidents • biological incidents • sabotage
Emergency preparedness and response data	May include: • gas levels and trends • change in temperature • change in ventilation • visibility • escape route conditions • status of caches, quick fill stations and first response stations • root cause of the emergency incident • status of communication equipment • status of monitoring equipment • location and condition of persons • hazards identified on escape
Audit	• Is defined as a systematic examination against defined criteria to determine whether activities and related results conform to planned arrangement, and whether these arrangements are implemented effectively and are suitable to achieve the organization's policy and objectives
Equipment	Refers to that needed to control the incident and includes but is not restricted to:

	• self escape and first response equipment • firefighting equipment • rescue equipment • mining equipment • transport • specialized equipment from external sources • monitoring and analysis equipment

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • knowledge of the requirements, procedures and instructions for applying and monitoring mineral processing emergency preparedness and response systems • implementation of appropriate procedures and techniques for the safe, effective and efficient application and monitoring of mineral processing emergency preparedness and response systems • working with others to plan, prepare, apply and monitor mineral processing emergency preparedness and response systems • provision of clear and timely instruction and supervision by the individual of those involved in mineral processing emergency preparedness and response systems • evidence of the consistent successful application and monitoring of mineral processing emergency preparedness and response systems
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • legislative and site requirements for emergency preparedness and response • audit and review processes and techniques • training and assessment principles • training systems • emergency response and evacuation planning processes and techniques • structure of emergency procedures guidelines • legal requirements of incident management teams • self escape, aided rescue and respond to incident philosophies, systems and equipment • risk management principles and techniques • structure of emergency organizations • intervention and control techniques for heating, fires, explosions, outburst, or inrushes • effects of heat and humidity • effects of visibility • escape strategies and technology • mine environmental risks and controls

	• equipment requirements for different types of emergency • ventilation and its influence on incidents • deployment of personnel underground under deputies control • procedure/policy for re-deployment of personnel underground after evacuation • call-out procedures • emotional effects of emergencies on rescuers and mine personnel • titles and roles of members of incident management team • the requirements and structure for place of safety/fresh air base • equipment handling • sealing procedures and the legislative implications
Underpinning Skills	Must demonstrate skills of: • apply legislative, organization and site requirements and procedures • access, interpret and apply technical information relevant to emergency preparedness and response • access, interpret and apply emergency preparedness and response information related to the mine • apply emergency preparedness and response systems and plans • collect, collate, interpret and report incident / emergency data • perform basic mathematical calculations • apply investigation and report preparation procedures • communicate effectively in the workplace • access, interpret and apply data from monitoring systems and equipment • operate hand held monitoring equipment • apply risk management processes and techniques • initiate the emergency preparedness and response training
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level IV	
Unit Title	**Apply, Monitor and Report on Compliance Systems**
Unit Code	**MIN UGM4 02 0114**
Unit Descriptor	This unit covers applying, monitoring and reporting on compliance systems in the mining industries. It includes identifying, sharing, planning and implementing legislation, codes, standards and business requirements; and monitoring, revising and reporting performance to ensure legal and contractual compliance.

Elements	Performance Criteria
1. Identify, share and implement legislation, codes, standards and business requirements	1.1. ***Compliance documentation*** relevant to the work activity including ***workplace legal compliance*** is accessed, interpreted and applied. 1.2. Information is provided in a language, style and format which are understood by colleagues. 1.3. Implications of non-compliance are clarified to all in the workplace.
2. Plan and implement legislation, codes, standards and business requirements	2.1. Systems of work with colleagues are planned to ensure compliance with ***legislation***, ***codes***, ***standards and business requirements***. 2.2. Systems of work are implemented with work colleagues to ensure compliance with legislation, codes, standards and business requirements. 2.3. Training needs of colleagues are identified and supported while managing the ***legal rights and responsibilities of the enterprise*** in which they work.
3. Monitor, revise and report performance to ensure legal and contractual compliance	3.1. Actual and potential problems are identified, revised and reported promptly to ensure legal and contractual compliance within the workplace. 3.2. Activities are managed to ensure maximum legal and contractual compliance resulting in the protection of business interests. 3.3. Recommendations on improvements are submitted to comply with legal and contractual requirements. 3.4. Contractual procurement rights are secured for goods and services and a business plan that is shared is supported with all members of the workplace. 3.5. Systems, records and reporting procedures are maintained.
4. Investigate and report non-	4.1. Non-compliance is investigated and dealt with according to legislative requirements and enterprise policies and

compliance	procedures. 4.2. Training needs are identified and the training of colleagues is supported in the acquisition of competencies to meet legal requirements and the associated standards. 4.3. Training programs and workplace practices are implemented to ensure that non-compliance is not repeated.

Variable	Range
Compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Workplace legal compliance	May include: • requirements for the maintenance and confidentiality of records of non-compliance • requirements for the maintenance of records of breaches • provision of information and training • regulations and code of practice relating to hazards present in work area • site/work/groups representatives and committees • issue resolution
Legislation, codes, standards and business requirements	May include: • OHS • business registration • taxation • legal • insurance • environmental • business structure
Legal rights and responsibilities of the enterprise	May include: • marketing the business in accordance with consumer legislation • operating the business with a duty of care (Law of Torts) • obligations imposed by choice of business structure

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • the requirements, procedures and instructions for applying, monitoring and reporting on compliance systems • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of compliance

	system requirements • working with others to plan, prepare and conduct compliance system requirements • evidence of the consistent successful application, monitoring and reporting on compliance systems
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • national, state/territory and local government legislative requirements affecting business operation • business registration and licensing requirements • legal rights and obligations of alternative ownership structures • relevant taxation and related legislative requirements and legal rights and responsibilities related to the business • bookkeeping and record keeping procedures to meet minimum financial and legal requirements • award and enterprise agreements, where required • industrial law relevant to recruitment and dismissal of employees • creation and termination of relevant legal contracts • duty of care imposed by the Law of Torts • work procedure/instruction writing in compliance with legal requirements and company policy
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements to compliance systems • display effective communication skills to report, consult and negotiate processes that satisfy legal requirements • display time management skills to prioritize tasks and meet targets • provide coaching and mentoring support • identify and clearly communicate key compliance issues
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level IV	
Unit Title	**Implement Work Place Information System**
Unit Code	**MIN UGM4 03 0114**
Unit Descriptor	This unit describes the performance outcomes, skills and knowledge required to implement the workplace information system. It involves the identification, acquisition, initial analysis and use of appropriate information, which plays a significant part in the organization's effectiveness.

Elements	Performance Criteria
1. Identify and source information needs	1.1. ***Information*** required by teams is determined and located. 1.2. Information held by the organization is acquired and reviewed to determine suitability, accessibility, currency and reliability according to ***organizational policies***.
2. Collect, analyze and report information	2.1. Information which is adequate and relevant to the needs of teams is collected in a timely manner. 2.2. Ensure information is collected in a format suitable for analysis, interpretation and dissemination. 2.3. Information is analyzed to identify and report relevant trends and developments in terms of the needs for which it was acquired.
3. Implement information systems	3.1. Management information systems are implemented effectively to store, retrieve and regularly review data for decision making purposes. 3.2. ***Technology*** available in the work area is used to manage information effectively. 3.3. Recommendations are submitted for improving the information system to ***designated persons and/or groups***.
4. Prepare for information system changes	4.1. Information about information system future needs is collected in consultation with ***colleagues***, including those who have a specialist role in resource management. 4.2. Estimates of information system future needs that reflect the organization's ***business plans***, and customer and supplier requirements are ensured. 4.3. Proposals are supported to secure resources by clearly presenting submissions that describe realistic options, benefits, costs and outcomes. 4.4. Team members are prepared to work with new technology and information system changes.

Variable	Range
Information	May include:

	• archived, filed and historical background data • continuous improvement and quality assurance data • data available internally or externally • data shared and retrieved in various forms such as in writing or verbally, electronically or manually • financial and contractual data • marketing and customer-related data • organizational performance data • planning and organizational documents • policies and procedures
Organizational policies	May include: • guidelines for decision making throughout the organization that link the formulation of strategy with its implementation • sets of accepted actions approved by the organization • Standard Operating Procedures
Technology	May include: • computerized systems and software such as databases, project management and word processing • telecommunications devices • any other technology used to carry out work roles and responsibilities
Designated persons and/or groups	May include: • groups designated in workplace policies and procedures • managers or supervisors with management roles and responsibilities concerning information systems • other stakeholders accessing the information system such as customers and service providers • other work groups or teams whose work will be affected by the system
Colleagues	May include: • employees at the same level or more senior managers • occupational health and safety committee members and other specialists • people from a range of social, cultural and ethnic backgrounds and with a range of physical and mental abilities • team members
Business plans	May include: • cash flow projections • long-term budgets/plans • operational plans • short-term budgets/plans • spreadsheet-based financial projections • targets or key performance indicators for production, productivity, wastage, sales, income and expenditure

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • analysis of the information that is required for the effective functioning of the team's work together • knowledge of the range of information systems that are, or should be, available in the workplace • ability to recognize what information system changes and improvements will be required in the future
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • information management systems and technology that would be associated with the workplace such as: ➢ budgets and financial management systems ➢ customer information software or records ➢ databases ➢ Personal Digital Assistant (PDA) ➢ product and service information ➢ project management software ➢ record management systems ➢ spreadsheets
Underpinning Skills	Must demonstrate of: • literacy skills to work with information, and to research and present information in ways that are appropriate to the work team • technology skills to work with a range of information systems
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level IV	
Unit Title	**Carry out the Risk Management Processes**
Unit Code	**MIN UGM4 04 0114**
Unit Descriptor	This unit covers the skills and knowledge required to carry out risk management processes in the coal and mining industries. It includes: determining the risk management process; identifying hazards; assessing risk; identifying unacceptable risk and potential actions; deciding on, implementing or facilitating of actions; reviewing the implementation of action; auditing the risk management process; and completing records and reports.

Elements	Performance Criteria
1. Determine the risk management process	1.1. ***Compliance documentation*** relevant to carry out risk management processes is accessed, interpreted and applied. 1.2. The process to be used for ***risk management*** is identified and determined. 1.3. ***Parameters of the risk assessment task*** are identified, developed and documented. 1.4. The data required to complete the risk assessment task is accessed, interpreted and applied.
2. Identify hazards	2.1. Types of potential ***hazards*** are identified and confirmed by reference to site circumstances, history and/or precedence. 2.2. Process is broken into steps or parts for detailed hazard identification. 2.3. The defined process of any potential variations from changes is added to work practices, systems or technology. 2.4. The steps or parts of the process are analyzed, and ***loss scenarios*** identified and documented.
3. Assess risk	3.1. The ***likelihood*** of the loss scenario is determined. 3.2. The ***consequence*** is analyzed and determined if the loss scenario should occur. 3.3. The ***risk level*** of the loss scenario is determined.
4. Identify unacceptable risk	4.1. Site criteria is sourced or determined for assessing the ***acceptability of risks*** in conjunction with the appropriate party. 4.2. The risk level or score is determined by the application of the approved site criteria. 4.3. Findings which are ambiguous, unclear or of doubtful accuracy are clarified by seeking expert advice.
5. Identify potential	5.1. Existing controls are identified.

actions	5.2. The range of ***risk controls*** which may be appropriate for identified unacceptable risks are identified, analyzed and documented. 5.3. Possible options are identified for risk control by the use of the ***hierarchy of controls***, considering the potential for operational effectiveness. 5.4. Feasible options for risk control are verified by preliminary analysis and consideration, including potential to provide an integrated response to the range of issues.
6. Decide on action	6.1. Most appropriate risk controls for the situation are selected from the feasible options. 6.2. The selected course of action is confirmed following analysis of resource requirements, cost, safety and welfare issues within site constraints. 6.3. The selected course of action is documented.
7. Implement or facilitate action	7.1. The course of action is implemented directly, or facilitated through others. 7.2. All ***safety regulations and procedures*** are observed and applied. 7.3. Communicate to all involved parties relevant information related to the new/revised ***work procedures*** and their implementation in accordance with site requirements.
8. Review the implementation of action	8.1. An ongoing review process is determined and facilitated to ensure implementation and application of risk controls in accordance with risk assessment outcomes, new or revised work procedures and accident investigation outcomes. 8.2. Process, actions and controls are reviewed to ensure continuing effectiveness in the changing work environment. 8.3. Respond to, or refer to the appropriate party for follow-up action, anomalies and shortcomings identified during the review process.
9. Audit the risk management process	9.1. Audits of risk management processes and work procedures are conducted to ensure compliance and effectiveness. 9.2. Changed requirements identified during audits are responded in a systematic and timely manner. 9.3. All risk management documentation covering the reason for, and changes made are completed and retained.

Variable	**Range**
Relevant	May include:

compliance documentation	• legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Risk	Is defined as: • the chance of something happening that will have an impact upon objectives. It is measured in terms of consequences and likelihood
Risk Management	Is defined as: • the systematic application of management policies, procedures and practices to the tasks of identifying, analyzing, assessing, treating and monitoring risk
Parameters of the risk management task	May include: • objectives • system boundaries • hazard and consequence type • methods/team processes • timing, venue/locations • consultation and communication processes
Risk Assessment	Is defined as: • the process used to determine risk management priorities by evaluating and comparing the level of risk against predetermined standards, target risk levels or other criteria
Hazards	Is defined as: • a source of potential harm or a situation with a potential to cause loss May involve: • equipment and materials • people • methods/plans/work systems • the work environment
Loss scenarios	May include: • hazards described as: ➢ incidents ➢ events or ➢ accidents
Likelihood	Is used as: • a qualitative description of probability and frequency
Consequence	Is defined as: • the outcome of an event or situation expressed qualitatively or quantitatively, being a loss, injury, disadvantage or gain
Risk level	Is determined by: • combination of likelihood and consequence

Risk Acceptance	Is defined as: • an informed decision to accept the likelihood and the consequences of a particular risk. The criteria for acceptability of risks must be determined by the organization's internal policy, goals and/or objectives
Risk Control	Is defined as: • that part of risk management which involves the provision of policies, standards and 2procedures to eliminate, avoid or minimize adverse risks facing an enterprise
Risk controls	May include: • those focused on personal safety - e.g., personal protective equipment, medical standards, drug and alcohol, stress management, evacuation procedures, fitness for duty • those focused on equipment/machinery safety - e.g., isolation, protection and guarding • hazard identification and monitoring • procedures for incident/emergency circumstances e.g. fire safety procedures, chemical safety procedures
Hierarchy of control	Should be considered using option types in sequence from: • eliminating the hazard • substitution • engineering controls • administrative controls (work procedures, etc), and finally • Personal Protective Equipment (PPE)
Safety regulations and procedures	May contain: • legislation and regulations • management plans • OHS policies • code of practice • manufacturer's instructions
Work procedures	May include: • Standard Operating Procedures (SOPs) • Safe Operating Procedures (SOPs) • Safe Work Procedures (SWPs) • Safe Job Procedures (SJPs)

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • the requirements, procedures and instructions to carry out the risk management processes • implementation of appropriate procedures and techniques for the safe, effective and efficient carrying out of risk management processes • working with others to plan, prepare and conduct risk management processes • provision of clear and timely instruction and supervision by the

	individual of those involved in carrying out the risk management processes • evidence of the consistent successful application in carrying out the risk management processes
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • relevant site and equipment safety requirements • statutory and site rules, policies, procedures and regulations • the risk management process • risk assessment scoping methods • risk assessment methods including: • identifying hazards • assessing risks • determining acceptability of risks • identifying existing controls • determining adequacy of current controls • identifying new potential controls • risk management documentation and reporting methods used at a mine site • methods of identifying Risk Control actions based on cost, safety and welfare issues • action planning and implementation methods • review and auditing methods • basic human physiology • the effects of hazards on people's health and hygiene • causes and effects of common diseases and disabilities
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures risk management processes • read, interpret, apply and communicate technical information, procedures, regulations in the workplace • apply effective communication with a range of people in the workplace • facilitate a group of people to achieve a required outcome • apply interview processes • facilitate and document scoping sessions for risk assessment • facilitate risk assessment exercises • participate in a risk assessment as team members • apply proactive hazard identification • apply hazard analyze to identify and score the risk • select the appropriate treatments reduce unacceptable risk • apply Risk Assessment documentation requirements • apply Risk Management documentation requirements and procedures • maintain relevant records and documents • audit systems for compliance and effectiveness, and recommend changes to improve effectiveness

	• monitor and recommend changes to processes • identify hazards which may have acute and long-term effects on people
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level IV	
Unit Title	**Implement and Monitor Environmentally Sustainable Work Practices**
Unit Code	**MIN UGM4 05 0114**
Unit Descriptor	This unit describes the performance outcomes, skills and knowledge required to effectively analyze the workplace in relation to environmentally sustainable work practices and to implement improvements and monitor their effectiveness. This unit requires the ability to access industry information, applicable legislative and Occupational Health and Safety (OHS) guidelines.

Elements	Performance Criteria
1. Investigate current practices in relation to resource usage	1.1. Environmental regulations are identified by applying to the enterprise. 1.2. Procedures are analyzed for assessing compliance with environmental/sustainability regulations. 1.3. Information on environmental and resource efficiency systems and procedures is collected, and provided to the work group where appropriate. 1.4. Information is collected, analyzed and organized from a range of ***sources*** to provide information/advice and tools/resources for improvement opportunities. 1.5. Current resource usage of members of the work group is measured and documented. 1.6. Current ***purchasing strategies*** are analyzed and documented. 1.7. Current work processes are analyzed to access information and data to assist in identifying areas for improvement.
2. Set targets for improvements	2.1. Input is sought from ***stakeholders***, ***key personnel and specialists***. 2.2. External sources of information and data are accessed as required. 2.3. Alternative solutions are evaluated to workplace environmental issues. 2.4. Efficiency targets are set.
3. Implement performance improvement strategies	3.1. Appropriate ***techniques and tools*** are sourced and used to assist in achieving efficiency targets. 3.2. Continuous improvement strategies are applied to own work area of responsibility, including ideas and possible solutions to communicate to the work group and management.

	3.3. ***Environmental and resource efficiency improvement plans*** for own work group are implemented and integrated with other operational activities. 3.4. Team members are supervised and supported to identify possible areas for improved practices and resource efficiency in work area. 3.5. ***Suggestions*** and ideas about environmental and resource efficiency management are sought from stakeholders and acted upon where appropriate. 3.6. Costing strategies are implemented to fully value environmental assets.
4. Monitor performance	4.1. Evaluation and monitoring, tools and technology are used and/or developed. 4.2. Outcomes to report on efficiency targets are documented and communicated to key personnel and stakeholders. 4.3. Strategies and improvement plans are evaluated. 4.4. New efficiency targets are set, and new tools and strategies investigated and applied. 4.5. Successful strategies and reward participants are promoted where possible.

Variables	**Range**
Sources	May include: • organization specifications • regulatory sources • relevant stakeholders • resource use
Purchasing strategies	May include: • influencing suppliers to take up environmental sustainability approaches • researching and participating in programs such as a supply chain program to purchase sustainable products
Stakeholders, key personnel and specialists	May include: • individuals and groups both inside and outside the organization who have direct or indirect interest in the organization's conduct, actions, products and services, including: ➢ customers ➢ employees at all levels of the organization ➢ government ➢ investors ➢ local community ➢ other organizations

	➢ suppliers • key personnel within the organization, and specialists outside the organization who may have particular technical expertise.
Techniques and tools	May include: • examination of invoices from suppliers • examination of relevant information and data • measurements made under different conditions • others as appropriate to the specific industry context
Environmental and resource efficiency improvement plans	May include: • addressing environmental and resource sustainability initiatives such as environmental management systems, action plans, green office programs, surveys and audits • applying the waste management hierarchy in the workplace • determining organization's most appropriate waste treatment including waste to landfill, recycling, re-use, recoverable resources and wastewater treatment • initiating and/or maintaining appropriate organizational procedures for operational energy consumption, including stationary energy and non-stationary (transport) • preventing and minimizing risks, and maximizing opportunities such as: • improving resource/energy efficiency • reducing emissions of greenhouse gases • reducing use of non-renewable resources • referencing standards, guidelines and approaches
Suggestions	May include ideas that help to: • prevent and minimize risks and maximize opportunities such as: ➢ usage of solar or renewable energies where appropriate ➢ reducing emissions of greenhouse gases ➢ reducing use of non-renewable resources ➢ making more efficient use of resources, energy and water • maximizing opportunities to re-use, recycle and reclaim materials • identifying strategies to offset or mitigate environmental impacts: ➢ purchasing carbon credits ➢ energy conservation ➢ reducing chemical use ➢ reducing material consumption • expressing purchasing power through the selection of suppliers with improved environmental performance e.g. purchasing renewable energy • eliminating the use of hazardous and toxic materials

Evidence Guide	
Critical Aspects of	Evidence of the following is essential:

Competence	• knowledge of relevant compliance requirements within work area • developing plans to make improvements • planning and organizing work group activities in relation to measuring current use and devising strategies to improve usage • monitoring resource use and improvements for environmental performance relative to work area and supervision • ensuring appropriate action is taken within work area in relation to environmental/sustainability compliance and potential hazards • implementing new approaches to work area in an effort to resolve and improve environmental and resource efficiency issues and reporting as required
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • best practice approaches relevant to own area of responsibility and industry • compliance requirements within work area for all relevant environmental/sustainability legislation, regulations and codes of practice including resource hazards/risks associated with work area, job specifications and procedures • environmental and energy efficiency issues, systems and procedures specific to industry practice • external benchmarks and support for particular benchmarks to be used within organization, including approaches to improving resource use for work area and expected outcomes • OHS issues and requirements • organizational structure and reporting channels and procedures • quality assurance systems relevant to own work area • strategies to maximize opportunities and to minimize impact relevant to own work area • supply chain procedures • terms and conditions of employment including policies and procedures, such as daily tasks, work area responsibilities, employee, supervisor and employer rights, equal opportunity
Underpinning Skills	Must demonstrate skills to: • analytical skills to analyze problems, to devise solutions and to reflect on approaches taken • change management skills • communication skills to answer questions, clarify and acknowledge suggestions relating to work requirements and efficiency • communication/consultation skills to support information flow from stakeholders to the work group

	• innovation skills to identify improvements, to apply knowledge about resource use to organizational activities and to develop tools • literacy skills to comprehend documentation, to interpret environmental and energy efficiency requirements, to create tools to measure and monitor improvements and to report outcomes • numeracy skills to analyze data on organizational resource consumption and waste product volumes • planning and organizing skills to implement environmental and energy efficiency management policies and procedures relevant to own work area • problem-solving skills to devise approaches to improved environmental sustainability and to develop alternative approaches as required • technology skills to operate and shut down equipment; where relevant, to use software systems for recording and filing documentation to measure current usage; and to use word processing and other basic software for interpreting charts, flowcharts, graphs and other visual data and information • supervisory skills to work effectively with a team
Resources Implication	Assessment is required to real or appropriate simulated situations, including work areas, materials and equipment, & information on workplace practices and OHS practices.
Methods of Assessment	Competency may be assessed through: • Interview / Written Test • Observation / Demonstration and Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level IV	
Unit Title	**Apply and Monitor Systems for Stable Mining**
Unit Code	**MIN UGM4 06 0114**
Unit Descriptor	This unit covers applying and monitoring of systems for stable mining in the metalliferous mining industry. It includes: planning and preparing for and applying the design system, and applying monitoring and maintenance procedures.

Elements	Performance Criteria
1. Plan and prepare for the application of the design system	1.1. ***Compliance documentation*** relevant to the stable mining is accessed, interpreted and applied. 1.2. Work group and individual responsibilities and tasks are communicated and clarified. 1.3. ***Resources*** required for the application of the ***design*** system are identified, obtained and allocated. 1.4. Individual training needs are identified and satisfied through accessing the established design systems, programs and plans. 1.5. Safe operating procedures are accessed and interpreted. 1.6. The ***risks*** associated with unstable mining structures are identified and interpreted.
2. Apply the design system	2.1. Approved design system is communicated, applied and monitored. 2.2. Primary, secondary and other support ***systems*** are communicated and applied. 2.3. Mining constraints impacting on the maintenance of a ***stable mining*** structure are identified and assessed in accordance with the design system. 2.4. Ground support systems are installed, monitored and assessed. 2.5. System failures are identified and assessed. 2.6. Mining sequences are applied and monitored in accordance with the design system. 2.7. Virgin and induced ***stress*** control methods are identified and assessed. 2.8. Emergency response and evacuation plans and procedures are applied throughout the work and reported, where appropriate. 2.9. ***Safe operating procedures*** are applied and monitored throughout the work and report, where appropriate.

	2.10. Systems ***audit*** and requirements are reviewed.
3. Apply monitoring and maintenance procedures	3.1. Inspection, repair and maintenance activities are scheduled and carried out in accordance with design systems. 3.2. Maintenance and monitoring requirements and activities are recorded, reported and reviewed.
4 Document and review agency business strategies**.**	4.1. Business plan is documented to provide an accessible reference tool for evaluation of agency business performance. 4.2. Strategic directions are developed within the plans that are assessable against performance benchmarks over time.

Variable	**Range**
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Resources	May include: • skilled personnel • rock mechanics underground supports and equipment • power water/gas drainage systems • budgetary requirements
Mine design	May include: • requirements relating to footwall and hanging wall competency • mine plant • mining induced stress • ventilation, tunnels • sequencing • drives • shaft sinking • pillar extraction • partial extraction • punch mining • modeling • ore grades • geology • fault management • multi-seams • fault drivage • roof and floor technical data • over and underlying strata

	• footwall and long wall subsidence • legislative and statutory requirements • thickness • multiple and rider ore bodies • ore body dip and depth of cover
Risk	Is defined as: • the chance of something happening that will have an impact upon objectives. It is measured in terms of consequences and likelihood
Mining systems	May include: • bord and pillar • rock casing • out fill • overhand • underhand • place changing • auger mining • pillar extraction and extraction • partial extraction • punch mining • systems of entry
Stable mining structure controls	May include: • drive size • pillar sizes • depth of cover • underlying/overlying and adjacent rock formations • stress regimes • strata characteristics • water ingression • systems of mining • direction
Stress	Includes: • horizontal and vertical tectonic induced stress and mining induced stress
Standard operating procedures (SOP)	Are also known as: • safe working procedures, safe operating procedures and standard working procedures
Audit is:	• the validation process to ensure the system, procedures and processes meet the established objectives and are implemented

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • knowledge of the requirements, procedures and instructions for applying and monitoring systems for stable mining • implementation of appropriate procedures and techniques for

	the safe, effective and efficient application and monitoring of systems for stable mining • working with others to plan, prepare, apply and monitor systems for stable mining • provision of clear and timely instruction and supervision by the individual of those involved in applying and monitoring systems for stable mining • evidence of the consistent successful application and monitoring of systems for stable mining
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • legislative and statutory requirements for mining structures including mine plans, ventilation, gas monitoring, strata support and safety management plans • the systems of mining including tunnels, drives, shaft sinking, pillar extraction, partial extraction, punch mining and fault drivage • stress including mining induced stress, vertical and horizontal stress tectonics • sedimentology including subsidence, water bearing strata, permeability of seam and strata, hydrology, physical property testing, caving characteristics, gas content, and over and underlying and adjacent rock formations • systems of work including bord and pillar, place changing, rock casing, auger mining, pillar extraction, partial extension and punch mining • mining structure failure modes • exploration techniques • geology and gas characteristics • mining engineering principles • ground support systems • audit methodologies • historical information • identifying and clearly communicating key issues
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures • access, interpret and apply technical information • access and analyze archival and historical mine management information related to the mine and failure mode of mine structures • interpret and apply design criteria for mine management • communicate effectively in the workplace • apply operational procedures relating to mine management • conduct and report on audits • identify and evaluate geological and geotechnical information • propose practical recommendations for identified key issues

Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level IV	
Unit Title	**Manage Drill and Blasting Operations**
Unit Code	**MIN UGM4 07 0114**
Unit Descriptor	This unit covers the management of blasting operations in resources and infrastructure industries. It includes the requirements for managing: compliance with legislation; the storage, handling and transport of explosives; the implementation of blasting activities; special conditions; misfires; disposal of explosives; and the maintenance of blasting equipment.

Elements	Performance Criteria
1. Manage compliance with legislation	1.1. ***Compliance documentation*** relevant to the management of blasting operations is accessed, interpreted and applied. 1.2. The blast design criteria is accessed, interpreted and validated. 1.3. Relevant permits, licenses or authorities needed for blasting activities are identified and obtained. 1.4. The legislative and site requirements and procedures are applied for the purchase of ***explosives***. 1.5. The procedures are applied for the identification of ***potential hazards*** and the implementation and application of the site/organization risk management system. 1.6. The procedures are applied to monitor the setting up and security of explosives storage location in compliance with legislative and site requirements. 1.7. Legislative and site blasting reporting requirements and procedures are managed. 1.8. Any loss or theft of explosives is reported.
2. Manage the storage, handling and transport of explosives	2.1. The legislative and site requirements and procedures are applied for safe handling of explosives. 2.2. The legislative and site requirements, procedures and safety precautions are applied for the transport of explosives. 2.3. The legislative and site requirements, procedures and safety precautions are applied for the storage of explosives. 2.4. The legislative and site requirements and procedures are applied for setting-up and maintaining secure explosives ***storage locations***.
3. Manage the implementation of blasting activities	3.1. ***Environmental hazards*** are identified and the risks associated with blasting analyzed. 3.2. The ***blast plan*** is implemented. 3.3. The blast monitoring system is applied in accordance with site

	procedures. 3.4. Site and legislative procedures are applied to ensure that ***site inspections*** to confirm the blast plan are implemented. 3.5. The availability of the type and quantity of ***explosives and associated materials*** required for blasting are confirmed and managed. 3.6. The site procedures and legislative requirements are managed for the coordination of support requirements including vehicles, ***personnel*** and other ***equipment***. 3.7. Site procedures are applied for setting up and securing the blast area. 3.8. The special requirements are applied for secondary blasting operations. 3.9. ***Post-blasting coordination*** and ***inspection*** requirements are applied and managed. 3.10. All statutory and site-required ***documents*** are completed.
4. Manage special conditions	4.1. Potential hazards resulting from physical, biological or chemical situations which include heat, cold, climatic and electro-static condition are identified. 4.2. Special conditions that may occur are controlled and monitored. 4.3. Ensure that records and reports on special conditions are kept and maintained according to legislative and site requirements and procedures.
5. Manage misfires	5.1. Site procedures are applied for the re-assessment of the blast site for potential hazards and risks and ensuring work area is safe. 5.2. Blast area is inspected to identify ***misfires*** or potential misfires and cause of misfire identified. 5.3. The misfire area is secured and information communicated to other ***personnel*** who may be affected. 5.4. Procedures are applied for washing-out or re-charging, and re-firing is managed according to relevant legislation, standards and site procedures. 5.5. The area affected by blasting is communicated with other persons. 5.6. Misfires are recorded and reported according to relevant legislation and site procedures.
6. Manage the disposal of explosives	6.1. Damaged or ***deteriorated explosives*** and accessories are identified. 6.2. An applicable ***disposal method*** is selected for explosives and

	accessories. 6.3. The disposal of the damaged, deteriorated or surplus explosives is planned. 6.4. The disposal of damaged, deteriorated and surplus explosives and detonators is carried out in accordance with legislative requirements and site procedures. 6.5. Disposal activities are communicated to site emergency services.
7. Manage maintenance of blasting equipment	7.1. The equipment necessary is identified for use in preparing, initiating or ***monitoring*** blasting operations. 7.2. Maintenance is monitored and routine inspection of blast and blast monitoring equipment conducted in accordance with manufacturer's requirements and site procedures. 7.3. The maintenance of blast monitoring instrumentation is monitored to ensure valid calibration as specified in manufacturers' requirements and according to site procedures. 7.4. Ensure that maintenance and inspection records are kept according to site, manufacturer's or legislative requirements.

Variable	**Range**
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Explosives	May include: • high explosives (e.g. packaged and bulk high explosives) • low explosives (e.g. black powder) • deflagrating explosives (e.g. propellants used for secondary blasting) • detonators and detonator assemblies • detonating cords and accessories • fuses and igniter cords
Potential hazards	May include: • broken detonator leads • dust and fumes • faulty equipment • faulty explosives • ground conditions • high air and water pressures • high voltage electricity • hydraulic oil pressure

	• lost holes • misfires • trespassers • radio frequencies and transmitters • EMF hazards (e.g. static electricity, lightning) • hot ground
Storage locations	May include: • permanent licensed-to-store magazines • relocatable magazines • underground magazines • underground temporary storage • day boxes • on site temporary areas • designated transport vehicle
Environmental hazards	May include: • the transmission of compression-tension elastic vibrations in both solids and gases • the generation and projection of elements, compounds and particulates from the site of explosion and related quantifiable damage • physical damage to the environment • damage to infrastructure • damage to fauna and flora • impact on human and domestic animal life and amenity • perceived and psychological-emotional disturbance • fluctuations and alterations of the hydrosphere
Blast plan	May include: • location • sleeping charges • equipment required • security measures and procedures • monitoring requirements • type and quantity of explosives and initiation methods • wet or dry holes • stemming material
Site inspections	May include: • positioning stemming • cleaning up • weather check • fencing/signage and access routes • marking/hole identification • inspection • measuring holes • dewatering holes

Explosives and associated materials	May include: • blasting agents • detonators • detonating cords • water gels or emulsions • bulk or packaged • shaped charges • permitted explosives • high explosives • propellants • pressure loaders (kettle) • detonation mechanisms including: • bell wire • delay mechanisms • initiators • meter readings • safety fuses and tapes • tape • exploders • circuit testers • connecting wire and cables • crimpers • approved chord cutters • stemming rods • loading poles • gas bags • decking • stemming • hole liner • blast monitoring equipment • firing cables/bell wire • remote firing equipment (e.g. PED)
Personnel	May include: • shot firers • magazine keepers • contractors • drillers • drivers • miners • visitors • trainees/apprentices • inspectors • licensed operators • maintenance staff • management

	• service personnel • supervisors • surveyors • tradespersons
Equipment	May include: • vehicles approved for carrying dangerous goods and explosives • explosives mixers • pumps • plugs (to seal finished holes prior to loading) • measuring tape • cutting implements • blast monitoring systems • video cameras
Post-blast coordination	May include: • withdrawal of sentries • return of unused explosives and equipment • removal of signs • turning off safety devices • ventilation of area
Site inspections	May include: • positioning stemming • cleaning up • weather check • fencing/signage and access routes • marking/hole identification • inspection • measuring holes • dewatering holes
Documents, records, and reports	May include: • records of purchase • records of carriage • records of consumption and disposal of explosives • cart notes • magazine records • blast designs • blast plans • shotfirer's reports • blast monitoring records • complaints, injury and accident reports • records of face profiling and bore tracking surveys, videotapes or photographs • records may be kept as papers, bound forms, field books, computer printouts, floppy disks, videotapes, digital recordings, specific or routine reports or logbooks

Misfires	May be caused by: • faulty explosives or accessories • damaged or deteriorated explosives or accessories • improperly assembled explosives components • inappropriate or incomplete combinations of components • operator error or inexperience • inattention to detail or ignorance • environmental influences (e.g. wet weather or poor visibility)
Deteriorated explosives	May show symptoms of: • exudation • efflorescence • sweating • liquefaction • hardening • softening • discoloration • crystallisation • staining • damage to wrappers and carcasses • damage to containers • physical wear and tear • kinking • abrasions and cuts • crushing • loss of identification labels and markings • exposure to the elements
Disposal methods	May include: • burning by the shot firers on site • detonation in a production drill hole • detonation in a controlled manner • return to supplier or delivery or surrender to an explosives inspector

Evidence Guide	
Critical Aspects of Competence	Demonstrate knowledge and skills of: • knowledge of the requirements, procedures and instructions for the management of blasting operations • implementation of appropriate procedures and techniques for the safe, effective and efficient management of blasting operations • working with others to plan, prepare and conduct blasting operations • provision of clear and timely instruction and supervision by the individual of those involved in blasting operations • evidence of the consistent successful management of blasting

	operations
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • blast site procedures • explosives and safety and health legislation • emergency procedures • environmental procedures • equipment processes, technical capability and limitations • equipment safety requirements • basic geological and technical information • blast plans • hazardous goods procedures (handling and transport) • isolation and lock out procedures • manufacturers' instructions • management systems • preparation for and use of explosives • safe operating procedures • risk management including application of appropriate controls to identify risks • site procedures • transportation of explosives • job safety analysis • start up and shut down procedures • explosives storage procedures • types and characteristics of blasting agents, explosives and initiation systems • concepts such as density, velocity and relationships between variable • assimilation, interpretation and application of information and technical data • mathematical processes and applications • cause and management of misfires • identification of safety and environmental hazards • explosives disposal methods • record keeping requirements and formats
Underpinning Skills	Demonstrate skills to: • apply legislative, organization and site requirements and procedures • apply legislative and site requirements and procedure for blasting activities • select and use PPE • read plans and documents • apply electronic, radio and other means of communication • apply blasting preparation techniques • identify hazards/apply hazardous substances handling techniques • perform blasting mathematical calculations

	• apply diagnostic techniques • apply inspection and monitoring procedures for: • storage, handling and transport of explosives • charging • blast initiation • post blast activities • environmental impact monitoring • equipment maintenance management • explosives disposal • records maintenance
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level IV	
Unit Title	**Monitor and Control the Effects of Blasting on the Environment**
Unit Code	**MIN UGM4 08 0114**
Unit Descriptor	This unit covers the monitoring and controlling of the effects of blasting on the environment in resources and infrastructure industries. It includes developing monitoring and control strategies, implementing monitoring systems and reviewing strategies.

Element	Performance Criteria
1. Develop strategies to control the effects of blasting on the environment	1.1. ***Compliance documentation*** relevant to monitoring and control of the effects of blasting on the environment is accessed, interpreted and applied. 1.2. The environmental hazards and controls are identified and evaluated to minimize the impact on the environment of ***ground vibration*** resulting from blasting. 1.3. The environmental hazards and controls are identified and evaluated to minimize the impact on the environment of ***fly rock*** resulting from blasting. 1.4. The environmental hazards and controls are identified to minimize the impact on the environment of ***air blast***, ***noise and overpressure*** resulting from blasting. 1.5. The environmental hazards and controls are identified to minimize the impact on the environment of ***air pollution and dust*** resulting from blasting. 1.6. The environmental hazards and controls are identified to minimize the impact on the environment of water pollution resulting from blasting. 1.7. The objectives and criteria are identified and analyzed for safe and effective blast monitoring. 1.8. ***Monitoring device*** options are evaluated and selected. 1.9. Procedures are prepared for the installation, establishment and operation of ***monitoring*** systems. 1.10. The monitoring system ***maintenance*** program and procedures are formulated. 1.11. Procedures are determined for the audit, review and updating of the monitoring system.
2. Implement environment monitoring systems	2.1. Procedures are implemented for monitoring, recording and reporting on environmental controls according to statutory requirements. 2.2. Procedures are implemented for the installation and operation of monitoring systems and equipment.

	2.3. Procedures are implemented for the collection and analysis of environmental data. 2.4. Monitoring system data is processed, recorded and reported in accordance with site procedures and statutory requirements. 2.5. Measured data is interpreted, compared with statutory and site requirements and identified actions are implemented.
3. Review strategies	3.1. The effectiveness of the environmental control system is audited in order to ensure that blasting standards are complied with statutory and environmental management plan requirements. 3.2. The effectiveness of the environmental control system is audited in order to ensure that monitoring systems operate to statutory requirements. 3.3. The effectiveness of the environmental control system is audited in order to ensure that recording systems are maintained accurately and data are processed in accordance with environmental management plan requirements. 3.4. The monitoring system is reviewed to ensure that standards remain appropriate.

Variable	Range
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Mechanisms which may contribute to ground vibration	May include: • peak particle velocity • vibration • frequency • damage criteria
Vibration	May contribute to, or result in damage to, cracking and collapse of structures
Vibration controls	May include: • vibration monitoring • establishment of vibration limit
Fly rock	May result in: • injury to people • damage to buildings and services • scatter of materials
Air blast, noise and over pressure	May result in: • structural and building damage • public reaction
Mechanisms	May include:

which may contribute to air blast, noise and over pressure	• peak values • frequency range • damage criteria
Air blast, noise and over pressure controls	May include: • the establishment of noise limits • overpressure limits • measurement and recording • provision and testing of monitoring equipment
Air pollution	May include: • dust • toxic gases, including: • oxides of nitrogen • carbon monoxide • hydrocarbons • combination of toxic gases
Dust control measures	May include: • establishment of a dust control program • monitoring of dust • identification and responses to dust problems • selection of appropriate control measures
Design criteria for portable monitoring devices	May include: • battery capacity • battery recharge requirements • statutory compliance provision for: • calibration • size • weight • ease of operation • robust construction
Defects to monitoring devices	May include: • inferior design • deterioration of materials • inadequate quality of manufacture • physical damage • water damage
Monitoring	May include: • portable blasting seismographs • sound level meters • dust sampling tubes • video and still cameras
Maintenance	May include: • inspection • servicing • repair

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • knowledge of the requirements, procedures and instructions for the monitoring and control of the effects of blasting • implementation of procedures and techniques for the safe, effective and efficient monitoring and control of the effects of blasting • working with others to plan, prepare and conduct the monitoring and control of the effects of blasting • provision of clear and timely instruction and supervision by the individual of those involved in the monitoring and control of the effects of blasting • evidence of the consistent successful monitoring and control of the effects of blasting
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • legislative and statutory requirements and procedures • sources of legislation • differing geological features and conditions' effect on ground vibration, air blast and fly rock • portable monitoring equipment characteristics, technical capabilities and limitations • maintenance surveys and procedures • audit and review processes and techniques • procedures for estimation of ground vibration levels • procedures for estimation of blast overpressure
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures • access, interpret and apply safety rules and procedures • plan and coordinate work • assess the risks and hazards attached to explosives in the environment • interpret the impact of blast design on ground vibration, air blast and fly rock • interpret and apply manufacturer's instructions • audit data and apply to blasting strategy
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level IV	
Unit Title	**Apply and Monitor the Gas Drainage Management Plan**
Unit Code	**MIN UGM4 09 0114**
Unit Descriptor	This unit covers the application and monitoring of the gas drainage management plan in the coal industry. It includes planning and preparing for the application of the gas management plan, applying the gas drainage management procedures, applies gas drainage management system maintenance procedures.

Elements	Performance Criteria
1. Plan and prepare for the application of the gas management plan	1.1. ***Compliance documentation*** relevant to the work activity is accessed, interpreted and applied. 1.2. Roles and responsibilities are identified and clarified as specified in the ***gas drainage management plan***. 1.3. Work group and individual responsibilities and tasks are communicated and clarified in an effective and timely manner. 1.4. Resources required for the application of the gas drainage management plan are identified, obtained and allocated. 1.5. Individual training needs are identified and satisfied by accessing the established ***gas drainage management training*** program and systems. 1.6. Suggestions and recommendations are encouraged, received, reviewed and implemented where appropriate, for changes to gas drainage management procedures.
2. Apply the gas drainage management procedures	2.1. The impact of changes of gas that make, composition, concentration of gas on the ***mine atmosphere*** is identified and interpreted. 2.2. ***Hazard*** control procedures associated with gas drainage are identified and applied. 2.3. ***Gas monitoring system*** installation, operation and maintenance procedures are applied. 2.4. Drainage service extension and recovery procedures are applied 2.5. Gas drainage system maintenance requirement procedures are applied. 2.6. Procedures incorporating methods and practices are applied to minimize potential damage to the gas drainage system. 2.7. ***Action*** levels established are applied and monitored to minimize the hazards of gas drainage. 2.8. Gas drainage system information recording and reporting procedures are applied.

	2.9. Systems audit and requirements are reviewed in accordance with the gas drainage management plan.
3. Apply gas drainage management system maintenance procedures	3.1. Inspections, repair and maintenance activities are carried out in accordance with the gas drainage management plan. 3.2. Maintenance activities are recorded, reported and reviewed in accordance with the gas drainage management plan.

Variable	Range
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Gas drainage management plan	Including: • hazard identification and quantification • risk assessment • authority and responsibility • controls established to manage identified risks • reporting and communication • document control • audit and review May include procedures for: • gas drainage drilling program • gas or geological anomaly detection • mine atmosphere monitoring • stimulation techniques • goaf walls • reporting requirements • auditing • ventilation systems and usage • mine plan • action plans • systems of mining • response plans • emergency procedures • individual and group responsibilities • training and education procedures
Gas drainage management training	Applies to: • mine workers • tradesperson • permanent employees

	• contractors • mine officials • other special requirements
Mine atmosphere	Refers to all areas in the general mine ventilation district and beyond into waste working and goafs in the mine.
Hazards	Is defined as: • a source of potential harm or a situation with a potential to cause loss May include: • irrespirable atmosphere • noxious atmosphere • flammable or explosive mixtures • outbursts • induced outburst • gas under pressure • location of drainage pipes • static electricity
Gas drainage system	May include those for: • construction • action response • permit to work • condition monitoring • auditing • maintenance • document control • atmosphere monitoring • ventilation system control • communication systems • survey procedures • standard operating procedures • changes • training • recording/reporting
Action (alarm or trigger) level	Is a generic term used to describe a level determined at the mine site at which action is initiated or a response made.
Gas drainage infrastructure	May include: • vacuum pumps • pipes • stand pipes • gas separators and casing • surface installations • gas drainage plan including building • valves • hoses • water pumps • flame and lightening arresters

	• power supply to bore holes • cleaning equipment • air compressors • electricity and water services • pressure gauges • hydration plants
Gas drainage monitoring	May include: • continuous monitoring • leakage monitoring (laser beam technology) • portable (hand held) • monitoring • collection of bag samples • pipeflow and pressure measurements • gas chromatography • ventilation measurements from relevant areas
Standard Operating Procedures (SOP)	Are also known as safe working procedures, safe operating procedures and standard working procedures.
Mine gases	May be seam gases or gases from introduced sources
Ventilation systems	May include the use of: • main mine fan • auxiliary fans • brattice • regulators • seals • stoppings • overcasts • ventilation doors • surface drainage boreholes • pressure chambers
Geological conditions	May include: • faults • dykes • intrusions • strata deformities • induced stresses • depth of overlaying strata • strength of immediate strata • under and over the coal seam • mining lease gas make
Coal seam characteristics	May include inherent factors such as: • rank • petrology • moisture • particle size • seam gas make

	• pyrites • Or depositional factors such as: ➢ seam thickness ➢ multi seams ➢ seam dip ➢ depth of cover ➢ cleats ➢ friability ➢ interaction of other coal seams and gas makes ➢ clay bands within the coal seam ➢ molorites zones
Gas make characteristics	May include: • gas content • gas pressure • adsorption • desorption • hydrostatic pressure • strata moisture content • permeability and porosity • tectonic stress
Maintenance of the gas drainage system	May include: • inspection, servicing and repair

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • the requirements, procedures and instructions for applying and monitoring the gas drainage management plan • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of gas drainage management plan application and monitoring • working with others to plan, prepare and conduct the application and monitoring of the gas drainage management plan • evidence of the consistent successful application and monitoring of the gas drainage management plan
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • legislative and statutory requirements which may include those for gas drainage drilling, gas drainage installation, ventilation requirements, return airways gas levels, intake airway gas accumulated levels, gas control and distribution, environmental management, local government requirements, inspections and reporting • the methods of gas drainage and their applications/limitations against the mine design, mine and panel ventilation systems, systems of mining current and future mine development • the impact of gas drainage on mining techniques, mine and

	panel design and production output • the impact of the strata geology and coal seam characteristics on the gas drainage management plan, including coal seam gradient, moisture content, friability, the porous features of the coal seam, stresses and intrusions • outburst mining monitoring procedures • drilling options and related equipment and techniques • hazard management processes and techniques • the effects of the type and quantity of gas in the coal seam • the impacts of accumulation of coal dust after gas drainage has been completed • pressure changes; causes, the impacts on the ventilation system, and the effects on gas drainage • heat/humidity; the sources an factors which may impact on gas drainage and personnel • mine fans; fan laws, fan types, performance characteristics, configurations, applications and limitations in association with the gas drainage management plan • ventilation control devices; the types, purposes, design criteria and specifications, distribution/placement criteria and limitations in association with the gas drainage management plan • ventilation control devices; the types, purposes, design criteria and specifications, distribution/placement criteria and limitations • de-gassing; methods of control - including brattice, auxiliary fans, compressed air venturis, sails, hurdles and bleeders • fixed gas drainage monitoring systems types, characteristics, uses and limitations • portable monitoring equipment for gas drainage purposes, types, characteristics, uses and limitations • functions, capabilities, advantages, limitations and uses of gas drainage computer modeling and simulation techniques • computer-based systems for mine environment analysis • gas drainage management plan development requirements and processes • gas drainage surveys; the types, frequency and method for conducting including pressure/quantity/temperature and gas • processes and techniques for determining alarms and trigger points/levels • audit and review processes and techniques • emergency response and disaster planning processes and techniques • general uses and applications of ventilation theory, including: ➢ gas laws including Charles and Boyle ➢ natural ventilation pressures ➢ gas make

	➢ leakage ➢ Kirchoff's laws • mine operational procedures • strata control systems and their affects on gas drainage • mine and goaf ventilation systems • underground water management principles and systems • impacts of intersecting holes and hole design • site environmental monitoring requirements • statutory and mine reporting procedures
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures for applying and monitoring the gas drainage management plan • access, interpret and apply: ➢ technical information related to gas drainage ➢ site/legislative requirements ➢ geological reports ➢ briefings and handover details • access, interpret and apply relevant gas drainage data • assess the risks and consequences of gas drainage • apply procedures appropriate to mine operations for management of gas drainage • plan and coordinate work • operate hand held monitoring equipment • identify training needs related to gas drainage
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level IV	
Unit Title	**Monitor and Maintain the Ventilation Management Plan**
Unit Code	**MIN UGM4 10 0114**
Unit Descriptor	This unit covers the application and monitoring of the ventilation management plan in the resources and infrastructure industries. It includes planning and preparing for the application of the ventilation management plan, applying the plan, and applying ventilation system maintenance procedures.

Elements	Performance Criteria
1. Plan and prepare for the application of the ventilation management plan.	1.1. ***Compliance documentation*** relevant to the work activity is accessed, interpreted and applied. 1.2. The ***ventilation management plan*** is accessed and interpreted. 1.3. Roles and responsibilities are identified and clarified, as specified in the ventilation management plan. 1.4. Work group and individual responsibilities and tasks are communicated and clarified in an effective and timely manner. 1.5. Resources required for the application of the ventilation management plan are identified, obtained and allocated. 1.6. Individual training needs are identified and access to the established ***ventilation management training*** program and systems is provided.
2. Apply the ventilation management plan.	2.1. The impact of changes to the ventilation system on the ***mine atmosphere*** is identified and interpreted. 2.2. Installation and operation procedures are applied for monitoring systems and equipment. 2.3. ***Ventilation control device*** is installed, monitored and maintained in the ventilation system. 2.4. Procedures are applied for monitoring, recording and reporting on mine ventilation including ***defects*** to ventilation control devices. 2.5. Mine control devices are adjusted. 2.6. Collection and analysis of ventilation data are carried out. 2.7. Monitoring system data is recorded and reported. 2.8. ***Water*** management procedures are applied. 2.9. Alarms raised are responded. 2.10. Ventilation emergency and evacuation are applied.

	2.11. Systems audit and requirements are reviewed.
3. Apply ventilation system maintenance procedures.	3.1. Inspections repair and maintenance activities schedule and are carried out. 3.2. Maintenance requirements and activities are recorded, reported and reviewed.
4. Evaluate project outcomes.	4.1 Project processes and outcomes are evaluated in consultation with clients and relevant people using appropriate communication strategies. 4.2 Systematic review processes and established evaluation methods are identified and used to assess project processes and outcomes. 4.3 Evaluation results are prepared in the required format, style and structure and presented to relevant people within agreed timeframes. 4.4 Recommendations for improvement of project process are presented to relevant people according to organizational requirements. 4.5 Relevant documentation is completed and processed according to legislative and organizational procedures.

Variable	**Range**
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Ventilation management plan	May include: • establishing procedures for maintaining optimum mine ventilation including: ➢ hazard identification and quantification ➢ relevant emergency and evacuation procedures ➢ risk assessment ➢ authority and responsibility ➢ controls established to manage identified risks ➢ reporting and communication ➢ document control ➢ audit and review
Ventilation management training	Applies to: • mine workers • trades people • permanent employees

	• contractors • mine officials • other relevant special requirements
Ventilation control device	Includes: • door • regulator • seal • stopping • air crossings • pressure chambers • other control device to control or direct ventilation flows in a mine, and may include: ➢ doors ➢ regulators ➢ seals ➢ stoppings ➢ air crossings ➢ bulk heads ➢ goaf seals and pressure chambers ➢ air locks ➢ fans ➢ walls/barricades ➢ vent bags ➢ shafts ➢ rises
Defects	May include: • inferior design/deterioration of materials • inadequate quality of construction • physical damage • water damage
Water	May impact on the mine ventilation management plan through liberation of: • dissolved gases • capture of soluble gases and fumes • gas drainage efficiency • seam moisture infusion or drainage • dust liberation and suppression • large ingresses disrupting ventilation networks • ventilation requirements for pumping stations • influence on sponcom propensity • humidity • hydrostatic pressure

Evidence Guide	
Critical Aspects of Competence	Demonstrate knowledge and skills of: • knowledge of the requirements, procedures and instructions for

	application and monitoring of the ventilation management plan • implementation of requirements, procedures and techniques for the safe, effective and efficient application and monitoring of the ventilation management plan • working with others to plan, prepare and conduct application and monitoring of the ventilation management plan • evidence of the consistent successful application and monitoring of the ventilation management plan
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • legislative and statutory requirements for ventilation including air quality, maximum values, control and distribution, flammable gas and dust limits, ventilation fans, gas monitoring, respirable dust limits and inspections and recording/reporting • methods of mine ventilation and their applications/limitations • methods of panel ventilation and their applications/limitations • impact of mining techniques and mine and panel design on ventilation • mine roadways and shafts and their impact on mine ventilation • impact of geological characteristics and seam gradients on mine ventilation design • impacts on the ventilation system of gas drainage, spontaneous combustion, outburst and windblast • mine gases; the types and their characteristics, sources, physiological effects and methods of detection • dust, fumes and other particulate matter; the types, sources, physical and physiological effect and control/mitigation methods • mine fires; the types, sources of ignition, possible effects on the ventilation circuit and prevention/control/mitigation methods • mine explosions; the types, ignition sources, possible effects on the ventilation circuits and prevention/control/mitigation methods • pressure changes; causes, the impacts on the ventilation system, and responses • heat/humidity; the sources and factors which may impact on mine ventilation and personnel • mine fans • ventilation control devices • de-gassing • methods of control • fixed ventilation monitoring systems types, uses and limitations • portable monitoring equipment, types, characteristics, uses and limitations • ventilation management plan development requirements and processes • ventilation surveys including the types, frequency and method for conduct including pressure/quantity/temperature and gas • dust surveys for irrespirable quantity

	• processes and techniques for determining alarms and trigger points/levels • emergency and disaster plan response
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures for application and monitoring of the ventilation management plan • interpret and apply a limited range of mathematical and scientific theorems/laws related to ventilation • collect, collate and interpret ventilation data • interpret and apply ventilation device construction/installation specifications • conduct enquiries/investigations and prepare reports • communicate effectively in the workplace • access, interpret and apply data from monitoring systems and equipment • operate hand-held monitoring equipment • apply risk management processes and techniques • initiate ventilation training
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level IV	
Unit Title	**Establish and Maintain Mine Services and Infrastructure Systems**
Unit Code	**MIN UGM4 11 0114**
Unit Descriptor	This unit covers establishing and maintaining mine services and infrastructure systems in underground coal mines. It includes: designing mine services and infrastructure systems; selecting plant, equipment or services; establishing installation and commissioning systems and procedures; establishing management systems for the operation and maintenance of plant, equipment or services; planning and preparing for the implementation of mine services and infrastructure; and establishing management systems to audit and review mine services and infrastructure systems.

Elements	Performance Criteria
1. Design mine services and infrastructure systems	1.1. ***Compliance documentation*** relevant to establishing and maintaining ***mine services and infrastructure*** systems is accessed, interpreted and applied. 1.2. The requirements for and purpose of mine services and infrastructure systems are identified in accordance with legislative requirements and the system of mining. 1.3. Specifications are established for the mine services and infrastructure systems from a comprehensive analysis of operating requirements. 1.4. Options are identified from an analysis of all relevant technical, operational and financial information. 1.5. The preferred systems options are selected on the basis of performance against ***specification*** requirements. 1.6. Potential locations are assessed for mine services and infrastructure by site inspection, located on mine plan and location is confirmed.
2. Select plant, equipment or services	2.1. The requirements for, and purpose of plant, equipment and services are identified against systems requirements. 2.2. A detailed scoping of the operational requirement is conducted and key selection criteria, including ***hazard*** identification and ***risk*** analysis are developed. 2.3. Specifications are established for the required plant, equipment and services. 2.4. The preferred plant, equipment and services options are selected on the basis of performance against specification requirements.

3. Establish installation and commissioning systems and procedures	3.1. A system is established to identify hazards and risks associated with the installation of plant, equipment and services are analyzed and evaluated. 3.2. Integration of new and existing ***systems and procedures*** is planned and prepared to achieve optimum performance. 3.3. Procedures are established for installing and commissioning plant, equipment and services. 3.4. Systems and procedures are established to satisfy identified training requirements.
4. Establish management systems for the operation and maintenance of plant, equipment or services	4.1. Operational procedures are established for plant, equipment and services from site and legislative requirements and incorporated into ***site documentation***. 4.2. ***Maintenance*** procedures are established for plant, equipment and services from site and legislative requirements and incorporated into site documentation. 4.3. Procedures are established for reviewing and modifying work processes. 4.4. The maintenance of emergency response and evacuation plant, equipment and services is established in accordance with site requirements. 4.5. The system is established for ***recording and reporting*** of plant, equipment and services information.
5. Plan and prepare for the implementation of mine services and infrastructure	5.1. The legislative and ***site requirements*** related to the implementation of mine services and infrastructure systems are identified and interpreted. 5.2. All personnel roles and responsibilities, related to the implementation of mine services and infrastructure systems are identified, clarified and communicated. 5.3. Resources required for the implementation of mine services and infrastructure systems are identified, forecasted, obtained and allocated/scheduled. 5.4. Mine services and infrastructure systems training program is implemented. 5.5. Suggestions and recommendations are encouraged, received, reviewed and implemented, where appropriate, for changes to mine services and infrastructure systems and implementation procedures.
6. Establish management systems to audit and review mine	6.1. Procedures area established to audit and review equipment compliance in accordance with legislative and site requirements. 6.2. Future plant, equipment and services requirements are

services and infrastructure systems	identified and assessed into the planning processes. 6.3. Procedures are established to audit and review the currency and compliance of operation and maintenance systems relating to plant, equipment and services. 6.4. Procedures are established to ***audit*** the training programs for currency and relevance. 6.5. Procedures are established for incorporating feedback into the audit/review system. 6.6. Procedures are established for response to instances of non-compliance or other discrepancies/deficiencies revealed by audit.

Variable	Range
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Mine services	May include, but not be limited to: • water • wastewater • compressed air • fire fighting • gas drainage • fuel • electrical reticulation • waste disposal • condition monitoring • communication • stone dust handling systems • mine refrigeration systems • sewerage handling systems
Infrastructure	Refers to fixed plant and equipment which may include: • fabrication and construction areas • servicing areas • re-fuelling points • workshops • dams • explosives magazines • training facility • bathrooms • HV switch rooms

	• lamp cabin • laboratory • storehouses • equipment storage areas • on site residential housing • site access (road, rail, air) • battery rooms • water treatment plant • sewerage treatment plant • offices • emergency facilities (First Aid, fire) • coal preparation plant • stockpile and coal load out • lathes • presses • gantry cranes • drills • grinders • service bays • testing rooms • process treatment plant • conveyor systems • pumps and stations • pipelines • ventilation fans • compressors • winders • haulage winches • battery chargers • air conditioning • generators • electrical switching/control/distribution equipment • gas plant
Specifications	May include, but are not limited to: • performance requirements • costs • dimensions • capacity • OHS requirements • training requirements • key selection criteria
Hazard	Is defined as: • a source of potential harm or a situation with a potential to cause loss
Risk	Is defined as:

	• the chance of something happening that will have an impact upon objectives. It is measured in terms of consequences and likelihood
Systems and procedures	May include: • design • development • establishment • installation • operations • protection • maintenance • monitoring • recording • reporting process
Standard operating procedures (SOP)	• Are also known as safe working procedures, safe operating procedures and standard working procedures
Site documentation and training policy	May include, but not be limited to: • legislative requirements • management plans and procedures
Maintenance	May be divided into: • predictive • preventative • breakdown
Recording and reporting	Systems include site requirements and consist of: • phones • radios • computer systems • verbal and written
Site requirements	May contain: • legislation, including, but not limited to ➢ mine plans, electric rules, gas drainage, compressed air, electrical / mechanical equipment, inspection requirement, environmental management, explosion barriers, communication, emergency procedures, risk management, recording and reporting, mines rescue, OHS, manufacturer instructions, standard work procedures, training and fire fighting, handling and storage of dangerous goods, local government and power authority requirements • safety management plans • OHS policy • code of practice • industry guidelines • approved standards • manufacturer instructions • standard operating procedures (or equivalent)
Audit	Is defined as:

	• a systematic examination against defined criteria to determine whether activities and related results conform to planned arrangement, and whether these arrangements are implemented effectively and are suitable to achieve the organization's policy and objectives
Safety systems	May include, but are not limited to: • legislation (legal requirements) • location of components in protection system • specific hazard management (e.g. spontaneous combustion, gas, noise, water, heat, dust) • protection systems (guarding, fire protection and suppression, electricity, lighting arresters, ventilation in explosives magazines and earthing)

Evidence Guide	
Critical Aspects of Competence	Demonstrate knowledge and skills of: • the requirements, procedures and instructions for establishing and maintaining mine services and infrastructure systems • implementation of procedures and techniques for the safe, effective and efficient establishing and maintaining of mine services and infrastructure systems • the identification of the relevant information and scope of the work required to meet the required outcomes • the identification of viable program options and the selection of programs that best meet the required outcomes • working with others to establish and maintain mine services and infrastructure systems • consistent and timely completion of the establishing and maintenance of mine services and infrastructure systems
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • legislative and site-specific requirements for mine services and infrastructure • emergency response and disaster planning processes and techniques • audit review process and techniques • mine operating procedures for mine services and infrastructure • mine design relating to mine services and infrastructure • energy sources including protection and reticulation systems for electrical, hydraulic, compressed air, diesel • safety design features of mine services and infrastructure • a basic knowledge of computer based systems related to the monitoring and operation of mine services and infrastructure • training programs • fire fighting systems • safety design features for maintenance of mine services and

	infrastructure • stores systems specifications for fixed plant and infrastructure
Underpinning Skills	Demonstrate skills of: • apply legislative, organization and site requirements and procedures • access, interpret and apply: ➢ technical information ➢ site / legislative requirements ➢ records and reports ➢ briefings and handover details • apply the principles of mine design • apply hazard identification and risk management processes • apply work planning and coordination procedures • apply training needs analysis • interpret and apply manufacturers' instructions
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level IV	
Unit Title	**Apply and Monitor the Outburst Management Plan**
Unit Code	**MIN UGM4 12 0114**
Unit Descriptor	This unit covers the application and monitoring of the outburst management plan in the coal industry. It includes planning and preparing for the application of the outburst mining management plan, applying and monitoring the outburst mining activities, and applying outburst mining management system maintenance procedures.

Elements	Performance Criteria
1. Plan and prepare for the application of the outburst mining management plan	1.1. ***Compliance documentation*** relevant to the work activity is accessed, interpreted and applied. 1.2. Roles and responsibilities are identified and clarified, as specified in the ***outburst mining management plan***. 1.3. Work group individual responsibilities and tasks are communicated and clarified in an effective and timely manner. 1.4. Resources required for the application of the outburst mining management plan are identified, obtained and allocated. 1.5. Individual training needs are identified and satisfied through accessing the established outburst mining management training program and systems. 1.6. And recommendations are encouraged, received, reviewed and implemented, where appropriate, suggestions for changes to outburst mining management procedures.
2. Apply and monitor the outburst mining activities	2.1. Procedures are interpreted and applied for covering the relocation, operation and maintenance of the drilling rig. 2.2. Core sampling techniques, procedures and processes are interpreted, applied and monitored. 2.3. Environmental monitoring, recording and reporting procedures are interpreted and applied. 2.4. Ventilation control measures which impact on outburst mining are interpreted, applied and monitored. 2.5. Actions and procedures are interpreted, applied and monitored in response to gas threshold levels. 2.6. Permit to mine procedures is confirmed, applied, communicated and posted. 2.7. Procedures are interpreted, applied and monitored by covering outburst mining personnel safety measures and techniques.

	2.8. Equipment protection/defensive requirements and measures are inspected to ensure compliance with standards. 2.9. Systems audit and requirements are reviewed in accordance with the outburst mining management plan.
3. Apply outburst mining management system maintenance procedures	3.1. Inspections repair and maintenance activities are carried out in accordance with the outburst mining management plan. 3.2. Maintenance activities are recorded, reported and reviewed in accordance with the outburst mining management plan.

Variable	Range
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Outburst mining management plans	Including: • hazard identification and quantification • risk assessment • authority and responsibility • controls established to manage identified risks • reporting and communication • document control • audit and review
Ventilation structures	May include: • stoppings • overcasts • regulators • preparation seals • fire doors • bulk heads • goaf seals • final seals • pressure chambers
Geological conditions	May include: • faults • dykes • intrusions and strata deformities • existing or induced stress or strain
Mine atmosphere monitoring	May include: • continuous monitoring • portable (hand held) monitoring

	• collection of bag samples • gas chromatography • ventilation measurements from all areas of the mine, including sealed area and waste workings
Defects to mine structures	May include: • deterioration of materials • quality of construction • effects of surrounding strata • physical damage • water damage
Infrastructure	Includes: • pipes • valves • hoses • pumps • drainage plant • flame arresters • power supply to bore holes • cleaning equipment • all other plant and equipment

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • the requirements, procedures and instructions for the application and monitoring of the outburst management plan • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of the application and monitoring of the outburst management plan • working with others to plan, prepare and conduct the application and monitoring of the outburst management plan • evidence of the consistent successful application and monitoring of the outburst management plan
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • legislative and statutory requirements for mining structures, including mine plans, ventilation, gas monitoring, strata support and safety management plans • mine planning and design • the systems of mining, including tunnels, drifts, stone drivage, shaft sinking, pillar extraction, partial extraction, punch mining and fault drivage • stress analysis, including mining induced stress and topography • sedimentology, including subsidence, water bearing strata, permeability of seam and strata, hydrology, physical property testing, caving characteristics, windblast, outburst, gas content and over and underlying strata

	• systems of work, including bord and pillar, place changing, longwall, high wall, auger mining, pillar extension, partial extension and punch mining • mining structure failure modes • exploration techniques • geology, lithology and strata gas characteristics • mining and general engineering principles relevant to the behavior of excavations in rock • ground support systems • audit methodologies • geotechnical engineering • excavation engineering • tunnel engineering and shaft sinking • rock mechanics • mine surveying • mining of coal deposits • thermodynamics • the impact of differing geological features and conditions on outburst, including faults, dykes, intrusions and strata deformities • mine gases; the types and their characteristics, sources, physiological effects and methods of detection • de-gassing; methods of control, including brattice, auxiliary fans, compressed air venturis, sails, hurdles and bleeders • fixed monitoring systems types, uses/limitations, design criteria, specifications and design processes • portable monitoring equipment, types, uses/limitations • computer-based systems for outburst analysis • mine outburst management plan development requirements and processes • processes and techniques for determining alarms and trigger points/levels • audit and review processes and techniques • emergency response and disaster planning processes and techniques • the effects of coal seam characteristics on outburst • methods of control of outburst • outburst indicators and ratios • risk management procedures • applicable mine rescue procedures • roles and responsibilities in accordance with outburst mining management plan
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures for applying and monitoring the outburst management plan

	• access, interpret and apply technical information • access and interpret archival and historical outburst information related to the mine • access and interpret design criteria for outburst management systems and devices • interpret computer spreadsheets and outburst modeling / simulations • conduct enquiries/investigations and prepare reports • communicate effectively in the workplace • access and interpret data from monitoring systems and equipment • operate hand held monitoring equipment • interpret outburst training requirement
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level IV	
Unit Title	**Identify and Assess Environmental and Heritage Concerns**
Unit Code	**MIN UGM4 13 0114**
Unit Descriptor	This unit covers identifying and assessing environmental and heritage concerns in resources and infrastructure industries. It includes identifying site specific environmental and heritage concerns; assessing and responding to environmental and heritage concerns; working within environmental and heritage guidelines.

Elements	Performance Criteria
1. Identify site specific environmental and heritage concerns	1.1. ***Compliance documentation*** relevant to ***environmental and heritage issues*** is accessed, interpreted and applied. 1.2. Environmental and heritage issues are identified and reported to ***relevant authority*** according to site procedures, regulations and other compliance requirements. 1.3. The nature of environment and/or heritage concerns is/are accurately identified from site information. 1.4. Emergency plan is enacted. 1.5. Relevant isolation procedures are enacted according to relevant requirements. 1.6. Contaminants are removed and/or contained upon identification.
2. Assess and respond to environmental and heritage concerns	2.1. Site on receipt of relevant clearances is inspected to confirm environment and/or heritage issues. 2.2. All required records and documentation are completed accurately and promptly.
3. Work within environmental and heritage guidelines	3.1. Environment and heritage issues are adhered. 3.2. Environmental and heritage guidelines are conformed in the organization of work activities. 3.3. Appropriate authorities of environmental and/or heritage issues are contacted and informed.

Variable	Range
Relevant Compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans

	• OHS policy
Environmental and heritage issues	May include: • ancient fossils • culturally-sensitive sites and artefacts • drainage • dust • emissions • flora and fauna • hazardous chemicals • heritage legislation • historical site (homestead) • noise • possible Indigenous site • runoff • spills • water quality
Relevant authorities	May include: • environmental authorities • experts (scientific, historic, biological) • local leaders

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • knowledge of the requirements, procedures and instructions for identifying and assessing environmental and heritage concerns • implementation of requirements, procedures and techniques for the safe, effective and efficient identification and assessment of environmental and heritage concerns • working with others to undertake and complete the identification and assessment of environmental and heritage concerns that meet all of the required outcomes • consistent timely completion of the identification and assessment of environmental and heritage concerns that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • contamination principles • emergency procedures • environmental and heritage procedures • equipment safety requirements • fire management strategies • future land use principles • hazardous goods procedures and consequences of spills • isolation procedures • mine operational system

	• night and day working procedures • OHS procedures • open cut procedures • operational procedures and checks • site procedures • site safety requirements
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures for identifying and assessing environmental and heritage concerns • apply diagnostic techniques • make decisions • apply procedures for operating, maintaining and cleaning equipment • identify hazards • apply hazardous goods handling techniques • interpret plans, reports, maps, specifications • apply records maintenances requirements and procedures • organize work tasks • apply safe work practices • work in a team • use communications equipment
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level IV	
Unit Title	**Lead Rescue Team**
Unit Code	**MIN UGM4 14 0114**
Unit Descriptor	This unit covers leading of rescue teams in underground mining operations. It includes: preparing for rescue operation; briefing team members; reporting to and liaising with Incident Control; leading and monitoring the rescue team; and completing team operations.

Elements	Performance Criteria
1. Prepare for rescue operation	1.1. ***Compliance documentation*** relevant to the underground mine rescue is accessed, interpreted and applied. 1.2. ***Information*** about the rescue operation is obtained and verified. 1.3. Mine plan is obtained and route of travel and mark on mine plan are determined. 1.4. ***Incident Control***, the strategy search patterns and contingency plans are developed, or agreed with for the rescue operation. 1.5. ***Communication*** system and equipment are implemented. 1.6. Team members' competence is assessed to meet the rescue situation and task requirements and constitute ***team***. 1.7. ***Team roles*** are allocated to best utilize individual team member competence. 1.8. Rescue and safety ***equipment*** and materials are identified, tested and allocated to team members. 1.9. Availability of any ancillary equipment required with Incident Control and/or mining personnel is determined and ensured.
2. Brief team members	2.1. Information is provided to team members on their roles, tasks and responsibilities to allow effective, safe rescue operation. 2.2. Team members understanding of their roles, tasks and responsibilities are ascertained.
3. Report to and liaise with Incident Control	3.1. Reporting formats and protocols are observed. 3.2. Rescue strategies are confirmed with incident control. 3.3. ***Operational advice*** is receives and followed from incident control. 3.4. Information to incident control which can affect team operations or safety is relayed to team members.

	3.5. Records required are completed in accordance with legislative requirements or site requirements.
4. Lead and monitor rescue team	4.1. Recommended procedures are carried out for entering hazardous or ***irrespirable atmospheres*** and situations. 4.2. Environment, tasks and hazards associated with rescue team's safety are continually assessed, and judgments applied to ensure tasks and procedures are carried out within rescue team's ability. 4.3. Hazards and implement controls are continuously assessed to minimize risk. 4.4. Team member's ***physical and emotional condition*** is monitored and appropriate action taken to address any problems. 4.5. Information about changes which can affect their operations or safety is provided to team members. 4.6. Team adheres are ensured to team rescue procedures according to standard rescue guidelines. 4.7. Coaching processes are implemented within the team and further assistance is identified.
5. Complete team operation	5.1. Verbal report to incident control is provided to advice of status of operation and significant variations to expected conditions. 5.2. Team is formally de-briefed to obtain and collate incident and procedural information. 5.3. Comprehensive oral and written report on team's deployment and consequential outcomes are provided to incident control. 5.4. Significant physical or emotional condition of team members is ***reported***. 5.5. Team members' critical incident stress debriefing and counseling are offered in an appropriate environment.

Variable	Range
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Information	May include: • arrivals • departures

	• team names • suit/set identification numbers • route of travel • expected time of return
Incident Control	• has overall planning, approval and control of an incident
Communications	May include: • reports • 2-way radio • telephone • mobile phone • hand signals • runners • light signals
Teams	Depending on such factors as: • respiratory protection • distance/communications
Team roles	May include: • rescue team leader • deputy rescue team leader • rescue team member
Equipment	• Is the equipment specified in the mine's rescue guidelines and protocols
Operational advice	May include: • re-location • evacuation • notification to active team • notification to surface
Irrespirable atmosphere	• Is considered as an atmosphere which is unsafe for a person to breathe as a result of either oxygen depletion or the presence of: ➢ toxic fumes ➢ gases ➢ contaminants
Physical condition	May be affected by: • heat exhaustion • dehydration • injuries from slipping / tripping / falls • respiratory problems • physical exhaustion • vomiting • workload
Emotional condition	May be affected by: • panic • fright • stress

	• distress • claustrophobia
Reports	• May be written or oral

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • the requirements, procedures and instructions for the leading of rescue teams in underground mines • implementation of appropriate procedures and techniques for the safe, effective and efficient leading of rescue teams in underground mines • working with others to plan, prepare and conduct underground mining rescue procedures • provision of clear and timely instruction and supervision by the individual of those involved in underground mining rescue • evidence of the consistent successful leadership of underground mining rescue procedures
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • principles of leadership • counseling techniques • rescue guidelines • reporting and recording methods and protocols • entrapment procedures • mining methods and environment • transport systems • ignition sources • gas testing and monitoring instruments - types, limitations, function and operation • types of fire and fire control methods • call-out procedures • rescue team procedures and equipment • standby / emergency procedures • effects on people working in hot and humid atmospheres • air measurement and ventilation systems • atmospheric monitoring and ventilation systems • types of breathing apparatus: their construction, operating principles and limitations • factors affecting oxygen/air consumption • techniques for resuscitation in irrespirable atmospheres • fresh air base procedures and communications • structure, role and responsibilities of Incident Control • critical incident stress debriefing • hazardous substances: their effects and controls • extrication methods • risk management procedures

Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures • apply leadership skills • work with teams • assess a situation and make effective, safe decisions • apply basic life support • apply procedures to establish search patterns and mark routes • apply risk assessments processes • apply contingency measures with breathing apparatus in emergency situations • select and use personal protection equipment • operate in escape apparatus • read and interpret mine plans and symbols • take air measurement and ventilation readings • take temperature and relative humidity measures • interpret and use signals • access, interpret and apply technical and safety information • apply diagnostic/faultfinding techniques • apply isolation procedures
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level IV	
Unit Title	**Coordinate Implementation of Customer Service Strategies**
Unit Code	**MIN UGM4 15 0114**
Unit Descriptor	This unit describes the performance outcomes, skills and knowledge required to advise on, carry out and evaluate customer service strategies, including the design of improvement strategies based on feedback. Operators may have responsibility to provide guidance or to delegate aspects of these tasks to others.

Elements	Performance Criteria
1. Advise on customer service needs	1.1 ***Customer needs*** are clarified and accurately assessed using appropriate ***communication techniques***. 1.2 Problems matching service delivery is diagnosed to ***customers*** and options developed for improved service within ***organizational requirements***. 1.3 Relevant and constructive advice is provided to promote the improvement of customer service delivery. 1.4 ***Business technology*** and/or ***online services*** is/are used to structure and present information on customer service needs.
2. Support implementation of customer service strategies	2.1 Ensure customer service strategies and opportunities are promoted to ***designated individuals and groups***. 2.2 Available budget resources are identified and allocated to fulfill customer service objectives. 2.3 ***Procedures*** are promptly used to resolve customer difficulties and ***complaints*** within organizational requirements. 2.4 Ensure that decisions are taken to implement ***strategies*** in consultation with designated individuals and groups.
3. Evaluate and report on customer service	3.1 Client satisfaction is reviewed with service delivery using verifiable data in accordance with organizational requirements. 3.2 Changes necessary to maintain service standards are identified and reported to designated individuals and groups. 3.3 Conclusions and recommendations are prepared from verifiable evidence and constructive advice on future directions of client service strategies is provided. 3.4 Systems, records and reporting procedures are maintained to compare changes in customer satisfaction.

Variable	Range
Customer needs	May relate to: • accuracy of information • advice or general information • complaints • fairness/politeness • further information • making an appointment • prices/value • purchasing organization's products and services • returning organization's products and services • specific information.
Communication techniques	May include: • analyzing customer satisfaction surveys • analyzing quality assurance data • conducting interviews • consultation methods, techniques and protocols • making recommendations • obtaining management decisions • questioning • seeking feedback to confirm understanding • summarizing and paraphrasing.
Customers	May include: • corporate customers • individual members of the organization • individual members of the public • internal or external • other agencies.
Organizational requirements	May include: • access and equity principles and practice • anti-discrimination and related policy • confidentiality and security requirements • defined resource parameters • ethical standards • goals, objectives, plans, systems and processes • legal and organizational policies, guidelines and requirements • OHS policies, procedures and programs • payment and delivery options • pricing and discount policies • quality and continuous improvement processes and standards • quality assurance and/or procedures manuals

	• replacement and refund policy and procedures • who is responsible for products or services.
Business technology	May include: • answering machine • binder • computer • fax machine • photocopier • printer • shredder • telephone.
Online services	May include: • access to product database by customers online • access to purchase, delivery and account records • contact centre • online ordering • online payments • online registration • quick/reasonable response • two-way communication online.
Designated individuals and groups	May include: • colleagues • committee • customers • external organization • line management • supervisor.
Procedures	May include: • external agencies (e.g. Ombudsman) • item replacement • referrals to supervisor • refund of monies • review of products or services • using conflict management techniques.
Customer complaints	May include: • administrative errors such as incorrect invoices or prices • customer satisfaction with service quality • damaged goods or goods not delivered • delivery errors • products not delivered on time • service errors • specific e-business problems and issues: ➢ difficulty accessing services ➢ inactive links

	➢ not appreciating differing hardware and software ➢ services not available ➢ supply errors such as incorrect product delivered ➢ time taken to access services ➢ unfriendly website design ➢ website faults • warehouse or store room errors such as incorrect product delivered.
Strategies	May include: • courtesy/politeness • delivery times • merchandise characteristics • price offers • product/refund guarantees • product/service availability.

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • identifying needs and priorities of the organization in delivering services to customers • responding to and reporting on customer feedback • designing strategies to improve delivery of products and services • knowledge of the principles of customer service.
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • key provisions of relevant legislation from all levels of government that may affect aspects of business operations, such as: ➢ anti-discrimination legislation ➢ ethical principles ➢ codes of practice ➢ privacy laws ➢ environmental issues ➢ Occupational Health and Safety (OHS) • principles of customer service • organizational business structure, products and services • product and service standards and best practice models.
Underpinning Skills	Must demonstrate: • communication skills to ➢ communicate effectively with personnel and clients at all levels ➢ articulate customer service strategies • interpersonal skills to: ➢ build relationships with customers ➢ establish rapport • literacy skills to:

	➢ prepare general information and papers ➢ read a variety of texts ➢ write formal and informal letters according to target audience • planning skills to develop implementation schedules • problem-solving skills to diagnose organizational problems relating to customer services • self-managements skills to: ➢ comply with policies and procedures ➢ consistently evaluate and monitor own performance ➢ seek learning opportunities.
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level IV	
Unit Title	**Apply Pit Plan**
Unit Code	**MIN UGM4 16 0114**
Unit Descriptor	This unit covers the application of the pit plan in the mining industries. It includes the requirements for planning, preparing for, initiating, monitoring, adjusting and reporting on the execution of the plan.

Elements	Performance Criteria
1. Plan, prepare for and initiate pit operations tasks.	1.1. ***Compliance documentation*** relevant to the undertaking of pit operations is accessed, interpreted and applied. 1.2. The ***geological and survey data*** required to complete the pit operations task is accessed and shared with team members. 1.3. The overall and the short term objectives of the site ***pit plan*** are accessed and shared with team members. 1.4. Likely ***hazards*** involved in the extraction operation and activities that require appropriate controls are identified, investigated and evaluated to maintain safety whilst achieving production targets. 1.5. An ***action plan*** is prepared in consultation with team members, which makes best use of the available resource and taken into account the requirements of the pit plan. 1.6. The necessary ***resources*** are acquired and made available for the safe, effective and efficient conduct of pit operations task. 1.7. Clear and timely ***instructions*** are issued to team members and others involved for the safe, effective and efficient conduct in the pit operations tasks.
2. Monitor, adjust and report on execution of the pit plan.	2.1. Safe, effective and efficient execution of pit operations tasks is ensured. 2.2. ***Pit plan performance*** is monitored to ensure achievement of planned outcomes. 2.3. Adjustments to work programs are initiated to take into account non-achievement of planned outcomes. 2.4. Reports are completed and submitted as required by the pit plan and other relevant requirements and procedures. 2.5. Changes are recommended to improve the safety, efficiency and effectiveness of the pit plan.

Variables	Range
Relevant	May include:

compliance documentation	• legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Geological data	May include relevant site-specific information in relation to: • rock type and characteristics • faults and joints • water tables or other water sources
Survey data	May include relevant site-specific information in relation to: • floor heights • bench widths • grades
Pit plan	May include: • limits of extraction area • land clearing and overburden stripping and stockpiling • raw feed extraction requirements (such as sequencing, face heights, bench widths) • bank stability criteria and supervision requirements • raw feed blending requirements • access and in-pit road requirements (such as grades, widths, turning and passing areas) • dewatering and water management requirements and procedures • finished pit shape and face requirements • rehabilitation and environmental works requirements (progressive and final) • tailings deposition/treatment requirements and procedures • roads maintenance requirements and procedures • reporting and record requirements and procedures
Hazard	• Is defined as a source of potential harm or a situation with a potential to cause loss
Action plan	May include: • extraction method • sequencing of activities • targets for the work group • materials transport • stockpiling • support services • waste dumping • measures to meet quality requirements
Resources	May include: • labor • materials

	• services • equipment
Instructions	May include: • nature and scope of tasks • achievement targets • operational conditions • obtaining permits required • site layout • out of bounds areas • worksite inspection requirements • lighting conditions • plant or equipment defects • hazards and potential hazards • coordination requirements or issues
Pit plan performance	Some examples include: • sequence of operations • interdependence of extraction and transport units • haul road, crusher and potential limiters • reliability of plant and recovery options • blasting timing size and interaction with other mining activities • in pit, waste dump and stockpile reserves, available storage space • potential bottlenecks in the production system • weather dependent activities • timing of maintenance activities and other stop events • time to completion of current step in site development • road maintenance • flooding

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • knowledge of the requirements, procedures and instructions for the application of the pit plan • implementation of appropriate procedures and techniques for the safe, effective and efficient application of the pit plan • working with others to plan, prepare and apply the pit plan • provision of clear and timely instruction and supervision by the individual of those involved in applying the pit plan • evidence of the consistent successful application of the pit plan
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • site risk, statutory compliance, health, safety, environmental, quality and communication requirements and procedures • pit plan • team leadership techniques • operational techniques required for execution of the plan

	• relevant plant and equipment operations appreciation • work planning techniques • work monitoring methods
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures • provide team leadership • apply communication skills • choose extraction and associated techniques • choose and assign plant and equipment • apply procedures to develop and administer work plans • write reports
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level IV	
Unit Title	**Plan and Organize Work**
Unit Code	**MIN UGM4 17 0114**
Unit Descriptor	This unit covers the knowledge, skills and attitude required in planning and organizing work activities in a production application. It may be applied to a small independent operation or to a section of a large organization.

Elements	Performance Criteria
1. Set objectives	1.1 ***Objectives*** are planned consistent with and linked to work activities in accordance with organizational aims. 1.2 Objectives are stated as measurable targets with clear time frames. 1.3 Support and commitment of team members are reflected in the objectives. 1.4 Realistic and attainable objectives are identified.
2. Plan and schedule work activities	2.1 Tasks/work activities to be completed are identified and prioritized as directed. 2.2 Tasks/work activities are broken down into steps in accordance with set time frames and achievable components. 2.3 Task/work activities are assigned to appropriate team or individuals in accordance with agreed functions. 2.4 ***Resources*** are allocated as per requirements of the activity. 2.5 ***Schedule of work activities*** is coordinated with personnel concerned.
3. Implement work plans	3.1 ***Work methods and practices*** are identified in consultation with personnel concerned. 3.2 ***Work plans*** are implemented in accordance with set time frames, resources and ***standards***.
4. Monitor work activities	4.1 Work activities are monitored and compared with set objectives. 4.2 Work performance is monitored. 4.3 Deviations from work activities are reported and recommendations are coordinated with appropriate personnel and in accordance with set standards. 4.4 Reporting requirements are complied with in accordance with recommended format. 4.5 Timeliness of report is observed.

	4.6 Files are established and maintained in accordance with standard operating procedures.
5. Review and evaluate work plans and activities	5.1 Work plans, strategies and implementation are reviewed based on accurate, relevant and current information. 5.2 Review is done based on comprehensive consultation with appropriate personnel on outcomes of work plans and reliable feedback. 5.3 Results of review are provided to concerned parties and formed as the basis for adjustments/simplifications to be made to policies, processes and activities. 5.4 Performance appraisal is conducted in accordance with organization rules and regulations. 5.5 Performance appraisal report is prepared and documented regularly as per organization requirements. 5.6 Recommendations are prepared and presented to ***appropriate personnel/authorities***. 5.7 ***Feedback mechanisms*** are implemented in line with organization policies.

Variable	**Range**
Objectives	May include but not limited to: • Specific • General
Resources	May include but not limited to: • Personnel • Equipment and technology • Services • Supplies and materials • Sources for accessing specialist advice • Budget
Schedule of work activities	May include but not limited to: • Daily • Work-based • Contractual Regular May include but not limited to: • Daily • Work-based • Contractual Regular
Work methods and practices	May include but not limited to: • Legislated regulations and codes of practice • Industry regulations and codes of practice • Occupational health and safety practices
Work plans	May include but not limited to: • Daily work plans • Project plans

	• Program plans o Resource plans • Skills development plans • Management strategies and objectives
Standards	May include but not limited to: • Performance targets • Performance management and evaluation systems • Occupational standards • Employment contracts • Client contracts • Discipline procedures • Workplace assessment guidelines • Internal quality assurance • Internal and external accountability and auditing requirements • Training Regulation Standards • Safety Standards
Appropriate personnel/ authorities	May include but not limited to: • Appropriate personnel include: • Management • Line Staff
Feedback mechanisms	May include but not limited to: • Verbal feedback • Informal feedback • Formal feedback • Questionnaire • Survey • Group discussion

Evidence Guide	
Critical Aspects of Competence	Assessment requires evidence that the candidate: • set objectives • plan and schedule work activities • implement work plans • monitor work activities • reviewed and evaluated work plans and activities
Underpinning Knowledge and Attitudes	Demonstrates knowledge of: • organization's strategic plan, policies rules and regulations, laws and objectives for work unit activities and priorities • organizations policies, strategic plans, guidelines related to the role of the work unit • team work and consultation strategies
Underpinning Skills	Demonstrates skill of: • planning • leading • organizing • coordinating

	• communication skills • inter-and intra-person/motivation skills • presentation skills
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level IV	
Unit Title	**Migrate to New Technology**
Unit Code	**MIN UGM4 18 0114**
Unit Descriptor	This unit defines the competence required to apply skills and knowledge in using new or upgraded technology. The rationale behind this unit emphasizes the importance of constantly reviewing work processes, skills and techniques in order to ensure that the quality of the entire business process is maintained at the highest level possible through the appropriate application of new technology. To this end, the person is typically engaged in on-going review and research in order to discover and apply new technology or techniques to improve aspects of the organization's activities.

Elements	Performance Criteria
1. Apply existing knowledge and techniques to technology and transfer	1.1 Situations are identified where existing knowledge can be used as the basis for developing new skills. 1.2 New or upgraded technology skills are acquired and used to enhance learning. 1.3 New or upgraded equipment are identified, classified and used where appropriate, for the benefit of the organization.
2. Apply functions of technology to assist in solving organizational problems	2.1 Testing of new or upgraded equipment is conducted according to the specification manual. 2.2 Features of new or upgraded equipment are applied within the organization. 2.3 Features and functions of new or upgraded equipment are used for solving organizational problems. 2.4 Sources of information relating to new or upgraded equipment are accessed and used.
3. Evaluate new or upgraded technology performance	3.1 New or upgraded equipment is evaluated for performance, usability and against OHS standards. 3.2 ***Environmental considerations*** are determined from new or upgraded equipment. 3.3 ***Feedback*** is sought from users where appropriate.

Variables	Range
Environmental Considerations	May include but is not limited to: • recycling, safe disposal of packaging (e.g. cardboard, polystyrene, paper, plastic) and correct disposal of waste materials by an authorized body
Feedback	May include but is not limited to: • surveys,

	• questionnaires, • interviews and meetings.

Evidence Guide	
Critical Aspects of Competence	Competence must confirm the ability to transfer the application of existing skills and knowledge to new technology
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • Broad awareness of current technology trends and directions in the industry (e.g. systems/procedures, services, new developments, new protocols) • Knowledge of vendor product directions • Ability to locate appropriate sources of information regarding metal manufacturing and new technologies • Current industry products/services, procedures and techniques with knowledge of general features • Information gathering techniques
Underpinning Skills	Demonstrate skills of: • Research skills for identifying broad features of new technologies • Ability to assist in the decision making process • Literacy skills in regard to interpretation of technical manuals • Ability to solve known problems in a variety of situations and locations • Evaluate and apply new technology to assist in solving organizational problems • General analytical skills in relation to known problems
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competency may be assessed through: • Interview / Written Test / Oral Questioning • Observation / Demonstration
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting

Occupational Standard: Underground Mining Level IV	
Unit Title	**Establish Quality Standards**
Unit Code	**MIN UGM4 19 0114**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to establish quality specifications for work outcomes and work performance. It includes monitoring and participation in maintaining and improving quality, identifying critical control points in the production of quality output and assisting in planning and implementing of quality assurance procedures.

Elements	Performance Criteria
1. Establish quality specifications for product	1.1 Market specifications are ***sourced*** and ***legislated requirements*** identified. 1.2 Quality specifications are developed and agreed upon. 1.3 Quality specifications are documented and introduced to organization staff / personnel in accordance with the organization policy. 1.4 Quality specifications are updated when necessary.
2. Identify hazards and critical control points	2.1. Critical control points impacting on quality are identified. 2.2. Degree of risk for each hazard is determined. 2.3. Necessary documentation is accomplished in accordance with organization quality procedures.
3. Assist in planning of quality assurance procedures	3.1 Procedures for each identified control point are developed to ensure optimum quality. 3.2 Hazards and risks are minimized through application of appropriate controls. 3.3 Processes are developed to monitor the effectiveness of quality assurance procedures.
4. Implement quality assurance procedures	4.1 Responsibilities for carrying out procedures are allocated to staff and contractors. 4.2 Instructions are prepared in accordance with the enterprise's quality assurance program. 4.3 Staff and contractors are given induction training on the quality assurance policy. 4.4 Staff and contractors are given in-service training relevant to their allocated ***safety procedures***.
5. Monitor quality of work outcome	5.1 Quality requirements are identified. 5.2 Inputs are inspected to confirm capability to meet quality requirements.

	5.3 Work is conducted to produce required outcomes. 5.4 Work processes are monitored to confirm quality of output and/or service. 5.5 Processes are adjusted to maintain outputs within specification.
6. Participate in maintaining and improving quality at work	6.1 Work area, materials, processes and product are routinely monitored to ensure compliance with quality requirements. 6.2 Non-conformance in inputs, process, product and/or service is identified and reported according to workplace reporting requirements. 6.3 Corrective action is taken within level of responsibility, to maintain quality standards. 6.4 Quality issues are raised with designated personnel.
7. Report problems that affect quality	7.1 Potential or existing quality problems are recognized. 7.2 Instances of variation in quality are identified from specifications or work instructions. 7.3 Variation and potential problems are reported to supervisor/manager according to enterprise guidelines.

Variable	**Range**
Sourced	May include but is not limited to: • End-users • Customers or stakeholders
Legislated requirements	May include but is not limited to: • Verification of product quality as part of consumer legislation or specific legislation related to product content or composition.
Safety procedures.	May include but is not limited to: • Use of tools and equipment for fabrication/production/ manufacturing works • Workplace environment and handling of material safety, • Following occupational health and safety procedures designated for the task • Respect the policies, regulations, legislations, rule and procedures for manufacturing/production/fabrication works

Evidence Guide	
Critical Aspect of Competence	Assessment requires evidence that the candidate: • Monitor quality of work • Establish quality specifications for product • Participate in maintaining and improving quality at work • Identify hazards and critical control points in the production of quality product

	• Assist in planning of quality assurance procedures • Report problems that affect quality • Implement quality assurance procedures
Underpinning Knowledge	Demonstrates knowledge of: • work and product quality specifications • quality policies and procedures • improving quality at work • hazards and critical points of operation • obtaining and using information • applying federal and regional legislation within day-today work activities • accessing and using management systems to keep and maintain accurate records • requirements for correct preparation and operation • technical writing
Underpinning Skills	Demonstrates skills in: • monitoring quality of work • establishing quality specifications for product • participating in maintaining and improving quality at work • identifying hazards and critical control points in the production of quality product • assisting in planning of quality assurance procedures • reporting problems that affect quality • implementing quality assurance procedures
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competency may be assessed through: • Interview / Written Test / Oral Questioning • Observation / Demonstration
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level IV	
Unit Title	**Develop Individuals and Team**
Unit Code	**MIN UGM4 20 0114**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to determine individual and team development needs and facilitate the development of the workgroup.

Elements	Performance Criteria
1. Provide team leadership	1.1 ***Learning and development needs*** are systematically identified and implemented in line with ***organizational requirements***. 1.2 Learning plan to meet individual and group training and developmental needs is collaboratively developed and implemented. 1.3 Individuals are encouraged to self-evaluate performance and identify areas for improvement. 1.4 ***Feedback on performance*** of team members is collected from relevant sources and compared with established team learning process.
2. Foster individual and organizational growth	2.1 Learning and development program goals and objectives are identified to match the specific knowledge and skills requirements of Competence standards. 2.2 ***Learning delivery methods*** are made appropriate to the learning goals, the learning style of participants and availability of equipment and resources. 2.3 Workplace learning opportunities and coaching/ mentoring assistance are provided to facilitate individual and team achievement of competencies. 2.4 Resources and timelines required for learning activities are identified and approved in accordance with organizational requirements.
3. Monitor and evaluate workplace learning	3.1 Feedback from individuals or teams is used to identify and implement improvements in future learning arrangements. 3.2 Outcomes and performance of individuals/teams are assessed and recorded to determine the effectiveness of development programs and the extent of additional support. 3.3 Modifications to learning plans are negotiated to improve the efficiency and effectiveness of learning. 3.4 Records and reports of competence are maintained within organizational requirement.

4. Develop team commitment and cooperation	4.1 Open communication processes to obtain and share information is used by team. 4.2 Decisions are reached by the team in accordance with its agreed roles and responsibilities. 4.3 Mutual concern and camaraderie are developed in the team.
5. Facilitate accomplishment of organizational goals	5.1 Team members are actively participated in team activities and communication processes. 5.2 Individual and joint responsibility is developed by teams' members for their actions. 5.3 Collaborative efforts are sustained to attain organizational goals.

Variable	Range
Learning and development needs	May include but is not limited to: • Coaching, monitoring and/or supervision • Formal/informal learning program • Internal/external training provision • Work experience/exchange/opportunities • Personal study • Career planning/development • Performance evaluation • Workplace skills assessment • Recognition of prior learning
Organizational requirements	May include but is not limited to: • Quality assurance and/or procedures manuals • Goals, objectives, plans, systems and processes • Legal and organizational policy/guidelines and requirements • Safety policies, procedures and programs • Confidentiality and security requirements • Business and performance plans • Ethical standards • Quality and continuous improvement processes and standards
Feedback on performance	May include but is not limited to: • Formal/informal performance evaluation • Obtaining feedback from supervisors and colleagues • Obtaining feedback from clients • Personal and reflective behavior strategies • Routine and organizational methods for monitoring service delivery
Learning delivery methods	May include but is not limited to: • On the job coaching or monitoring • Problem solving • Presentation/demonstration • Formal course participation

	• Work experience and involvement in professional networks • Conference and seminar attendance

Evidence Guide	
Critical Aspects of Competence	Assessment requires evidence that the candidate: • identify and implement learning opportunities for others • give and receive feedback constructively • facilitate participation of individuals in the work of the team • negotiate plans to improve the effectiveness of learning • prepare learning plans to match skill needs • access and designate learning opportunities
Underpinning Knowledge and Attitude	Demonstrates knowledge of: • coaching and monitoring principles • understanding how to work effectively with team members who have diverse work styles, aspirations, cultures and perspective • understanding how to facilitate team development and improvement • understanding methods and techniques to obtain and interpreting feedback • understanding methods for identifying and prioritizing personal development opportunities and options • knowledge of career paths and competence standards in the industry
Underpinning Skills	Demonstrates skills in: • reading and understanding a variety of texts, preparing general information and documents according to target audience; spell with accuracy; use grammar and punctuation effective relationships and conflict management • communication including receiving feedback and reporting, maintaining effective relationships and conflict management • planning skills to organize required resources and equipment to meet learning needs • coaching and mentoring skills to provide support to colleagues • reporting to organize information; assess information for relevance and accuracy; identify and elaborate on learning outcomes • facilitation to conduct small group training sessions • relating to people from a range of social, cultural, physical and mental backgrounds
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competency may be assessed through: • Interview / Written Test / Oral Questioning • Observation / Demonstration
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level IV	
Unit Title	**Utilize Specialized Communication Skills**
Unit Code	**MIN UGM4 21 0114**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to use specialized communication skills to meet specific needs of internal and external clients, conduct interviews, facilitate group discussions, and contribute to the development of communication strategies.

Elements	Performance Criteria
1. Meet common and specific communication needs of clients and colleagues	1.1 Specific communication needs of clients and colleagues are identified and met. 1.2 Different approaches are used to meet communication needs of clients and colleagues. 1.3 Conflict is addressed promptly and in a timely way and in a manner which does not compromise the standing of the organization.
2. Contribute to the development of communication strategies	2.1 ***Strategies*** for internal and external dissemination of information are developed, promoted, implemented and reviewed as required. 2.2 Channels of communication are established and reviewed regularly. 2.3 Coaching in effective communication is provided 2.4 Work related network and relationship are maintained as necessary. 2.5 Negotiation and conflict resolution strategies are used where required. 2.6 Communication with clients and colleagues is appropriate to individual needs and organizational objectives.
3. Represent the organization	3.1 When participating in internal or external fora, presentation is relevant, appropriately researched and presented in a manner to promote the organization. 3.2 Presentation is made clear and sequential and delivered within a predetermined time. 3.3 Appropriate media is utilized to enhance presentation. 3.4 Differences in views are respected. 3.5 Written communication is made consistent with organizational standards.

	3.6 Inquiries are responded in a manner consistent with organizational standard.
4. Facilitate group discussion	4.1 Mechanisms which enhance ***effective group interaction*** are defined and implemented. 4.2 Strategies which encourage all group members to participate are used routinely. 4.3 Objectives and agenda are routinely set and followed for meetings and discussions. 4.4 Relevant information is provided to group to facilitate outcomes. 4.5 Evaluation of group communication strategies is undertaken to promote participation of all parties. 4.6 Specific communication needs of individuals are identified and addressed.
5. Conduct interview	5.1 A range of appropriate communication strategies are employed in ***interview situations***. 5.2 Different ***types of interview*** are conducted in accordance with the organizational procedures. 5.3 Records of interviews are made and maintained in accordance with organizational procedures. 5.4 Effective questioning, listening and nonverbal communication techniques are used to ensure that required message is communicated.

Variable	**Range**
Strategies	May include but is not limited to: • Recognizing own limitations • Utilizing techniques and aids • Providing written drafts • Verbal and non verbal communication
Effective group interaction	May include but is not limited to: • Identifying and evaluating what is occurring within an interaction in a non-judgmental way • Using active listening • Making decision about appropriate words, behavior • Putting together response which is culturally appropriate • Expressing an individual perspective • Expressing own philosophy, ideology and background and exploring impact with relevance to communication
Interview situations	May include but is not limited to: • Establish rapport • obtain facts and information

	• Facilitate resolution of issues • Develop action plans • Diffuse potentially difficult situation
Types of Interview	May include but is not limited to: • Related to staff issues • Routine • Confidential • Evidential • Non-disclosure • Disclosure

Evidence Guide	
Critical Aspects of Competence	Assessment requires evidence that the candidate: • Demonstrate effective communication skills with clients and work colleagues accessing service • Adopt relevant communication techniques and strategies to meet client particular needs and difficulties
Underpinning Knowledge and Values	Demonstrates knowledge of: • communication process • dynamics of groups and different styles of group leadership • communication skills relevant to client groups
Underpinning Skills	Demonstrates skills to: • full range of communication techniques including: ➢ active listening ➢ feedback ➢ interpretation ➢ role boundaries setting ➢ negotiation ➢ establishing empathy ➢ communication strategies • communication required to fulfill job roles as specified by the organization
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level IV	
Unit Title	**Manage and Maintain Small/Medium Business Operations**
Unit Code	**MIN UGM4 22 0114**
Unit Descriptor	This unit covers the operation of day-to-day business activities in a micro or small business. The strategies involve developing, monitoring and managing work activities and financial information, developing effective work habits, and adjusting work schedules as needed.

Elements	Performance Criteria
1. Identify daily work requirements	1.1 Work requirements are identified for a given time period by taking into consideration ***resources*** and constraints. 1.2 Work activities are prioritized based on business needs, requirements and deadlines. 1.3 If appropriate, work is allocated to relevant staff or contractors to optimize efficiency.
2. Monitor and manage work	2.1 People, resources and/or equipment are coordinated to provide optimum results. 2.2 Staff, clients and/or contractors are communicated within a clear and regular manner, to monitor work in relation to ***business goals*** or timelines. 2.3 ***Problem solving techniques*** are applied to work situations to overcome difficulties and achieve positive outcomes.
3. Develop effective work habits	3.1 Work and personal priorities are identified and a balance is achieved between competing priorities using appropriate ***time management strategies***. 3.2 Input from ***internal and external sources*** is sought and used to develop and refine new ideas and approaches. 3.3 Business or inquiries is/are responded to promptly and effectively. 3.4 Information is presented in a format appropriate to the industry and audience.
4. Interpret financial information	4.1 Relevant documents and reports are identified. 4.2 Documents and reports are read and understood and any implications discussed with appropriate persons. 4.3 Data and numerical calculations are analyzed, checked, evaluated, organized and reconciled. 4.4 Daily financial records and cash flow are maintained correctly and in accordance with legal and accounting requirements. 4.5 Invoices and payments are prepared and distributed in a

	timely manner and in accordance with legal requirements. 4.6 Outstanding accounts are collected or followed-up on.
5. Evaluate work performance	5.1 Opportunities for improvements are monitored according to business demands. 5.2 Work schedules are adjusted to incorporate necessary modifications to existing work and routines or changing needs and requirements. 5.3 Proposed changes are clearly communicated and recorded to aid in future planning and evaluation. 5.4 Relevant codes of practice are used to guide an ethical approach to workplace practices and decisions.

Variable	**Range**
Resources	May include but is not limited to: • staff • money • time • equipment • space
Business goals	May include but is not limited to: • sales targets • budgetary targets • team and individual goals • production targets • reporting deadlines
Problem solving techniques	May include but is not limited to: • gaining additional research and information to make better informed decisions • looking for patterns • considering related problems or those from the past and how they were handled • eliminating possibilities • identifying and attempting sub-tasks • collaborating and asking for advice or help from additional sources
Time management strategies	May include but is not limited to: • prioritizing and anticipating • short term and long term planning and scheduling • creating a positive and organized work environment • clear timelines and goal setting that is regularly reviewed and adjusted as necessary • breaking large tasks into smaller tasks • getting additional support if identified and necessary
Internal and	May include but is not limited to:

external sources	• staff and colleagues • management, supervisors, advisors or head office • relevant professionals such as lawyers, accountants, management consultants • professional associations

Evidence Guide	
Critical Aspects of Competence	A person must be able to demonstrate: • ability to identify daily work requirements and allocate work appropriately • ability to interpret financial documents in accordance with legal requirements
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • Federal and Local Government legislative requirements affecting business operations, especially in regard to Occupational Health and Safety (OHS), equal employment opportunity, industrial relations and anti-discrimination • technical or specialist skills relevant to the business operation • relevant industry code of practice • planning techniques to establish realistic timelines and priorities • identification of relevant performance measures • quality assurance principles and methods • relevant marketing, management, sales and financial concepts • methods for monitoring performance and implementing improvements • structured approaches to problem solving, idea management and time management
Underpinning Skills	Demonstrate skills to: • interpret legal requirements, company policies and procedures and immediate, day-to-day demands • communication skills including questioning, clarifying, reporting, and giving and receiving constructive feedback • numeracy skills for performance information, setting targets and interpreting financial documents and reports • technical and analytical skills to interpret business document, reports and financial statements and projections • ability to relate to people from a range of social, cultural and ethnic backgrounds and physical and mental abilities • problem solving skills to develop contingency plans • using computers and software packages to record and manage data and to produce reports • evaluation skills for assessing work and outcomes • observation skills for identifying appropriate people, resources and to monitor work

Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Underground Mining Level IV	
Unit Title	**Apply Problem Solving Techniques and Tools**
Unit Code	**MIN UGM4 23 0114**
Unit Descriptor	This unit of competency covers the knowledge, skills and attitude required to apply scientific problem solving techniques and tools to enhance quality, productivity and other kaizen elements on continual basis.

Elements	Performance criteria
1. Identify and select theme/problem.	1.1 ***Safety requirements*** are followed in accordance with safety plans and procedures. 1.2 All possible problems related to the process /Kaizen elements are listed using ***statistical tools and techniques***. 1.3 All possible problems related to kaizen elements are identified and listed on Visual Management Board/Kaizen Board. 1.4 Problems are classified based on obviousness of cause and action. 1.5 Critical factors like the number of customers affected, Potentials for bottlenecks, and number of complaints etc… is selected. 1.6 Problems related to priorities of ***Kaizen Elements*** are given due emphasis and selected.
2. Grasp current status and set goal.	2.1 The extent of the problem is defined. 2.2 Appropriate and achievable goal is set.
3. Establish activity plan.	3.1 The problem is confirmed. 3.2 High priority problem is selected. 3.3 The extent of the problem is defined. 3.4 Activity plan is established as per ***5W1H***.
4. Analyze causes of a problem.	4.1 All possible causes of a problem are listed. 4.2 Cause relationships are analyzed using***4M1E***. 4.3 Causes of the problems are identified. 4.4 Root causes are selected. 4.5 The root cause which is most directly related to the problem is selected. 4.6 All possible ways are listed using ***creative idea generation*** to eliminate the most critical root cause.

	4.7 The suggested solutions are carefully tested and evaluated for potential complications. 4.8 Detailed summaries of the action plan are prepared to implement the suggested solution.
5. Examine countermeasures and their implementation.	5.1 Action plan is implemented by ***medium KPT*** members. 5.2 Implementation is monitored according to the agreed procedure and activities are checked with preset plan.
6. Assess effectiveness of the solution.	6.1 ***Tangible and intangible results*** are identified. 6.2 The results are verified over time. 6.3 Tangible results are compared with targets using ***various types of diagram***.
7. Standardize and sustain operation.	7.1 If the goal is achieved, the new procedures are standardized and made part of daily activities. 7.2 All employees are trained on the new ***Standard Operating Procedures (SOPs)***. 7.3 SOP is verified and followed by all employees. 7.4 The next problem is selected to be tackled by the team.

Variables	**Range**
Safety requirements	may include but not limited to: • OHS requirements include legislation, material safety, managements system, hazardous substances and dangerous goods code and local safe operating procedures • Work is carried out in accordance with legislative obligations, environmental legislations, relevant health regulation, manual handling procedure and organization insurance requirements
Statistical tools and techniques	may include but not limited to: • 7 QC tools may include: ➢ Stratification ➢ Pareto Diagram ➢ Cause and Effect Diagram ➢ Check Sheet ➢ Control Chart/Graph ➢ Histogram ➢ Scatter Diagram • QC techniques may include: ➢ Brain storming ➢ Why analysis ➢ What if analysis ➢ 5W1H
Kaizen Elements	may include but not limited to:

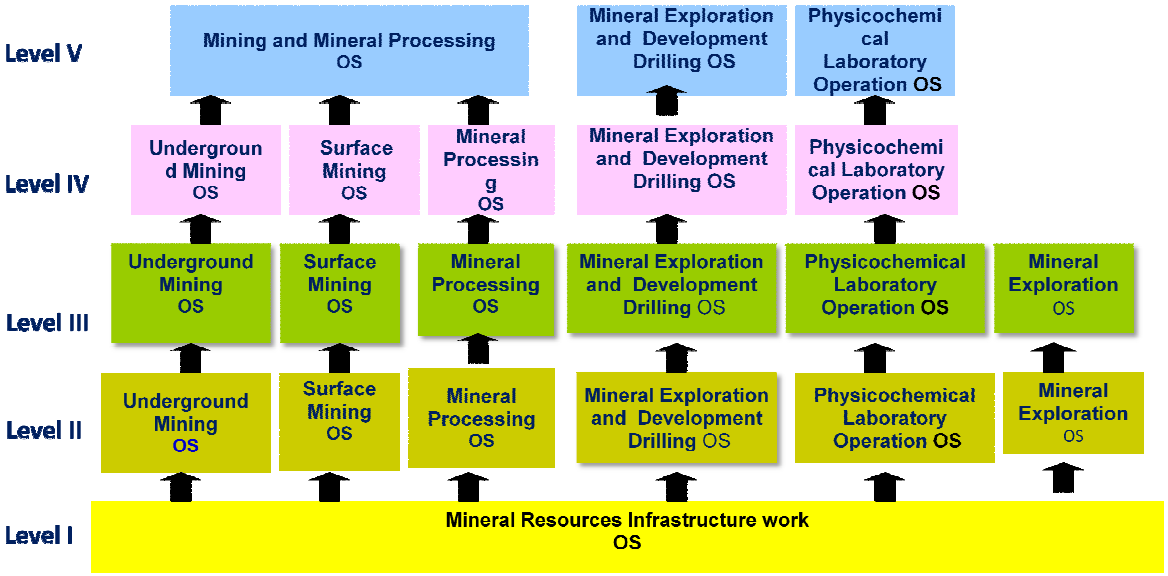
	• Quality • Cost • Productivity • Delivery • Safety • Moral • Environment • Gender equality
5W1H	may include but not limited to: • Who: person in charge • Why: objective • What: item to be implemented • Where: location • When: time frame • How: method
4M1E	may include but not limited to: • Man • Machine • Method • Material and • Environment
Creative idea generation	may include but not limited to: • Brainstorming • Exploring and examining ideas in varied ways • Elaborating and extrapolating • Conceptualizing
Medium KPT	may include but not limited to: • 5S • 4M (machine, method, material and man) • 4P (Policy, procedures, People and Plant) • PDCA cycle • Basics of IE tools and techniques
Tangible and intangible results	may include but not limited to: • Tangible result may include: ➢ Quantifiable data • Intangible result may include: ➢ Qualitative data
Various types of diagram	may include but not limited to: • Line graph • Bar graph • Pie-chart • Scatter diagram • Affinity diagram
Standard Operating Procedures (SOPs)	may include but not limited to: • The customer demand

	• The most efficient work routine (steps) • The cycle times required to complete work elements • All process quality checks required to minimize defects/errors • The exact amount of work in process required

Evidence Guide	
Critical Aspects of Assessment	Demonstrates skills and knowledge competencies to: • Apply all relevant procedures and regulatory requirements to ensure quality and productivity of an organization. • Detect non-conforming products/services in the work area • Apply effective problem solving approaches/strategies. • Implement and monitor improved practices and procedures • Apply statistical quality control tools and techniques.
Underpinning Knowledge and Attitude	Demonstrates knowledge of: • QC story/PDCA cycle/ • QC story/ Problem solving steps • QCC techniques • 7 QC tools • Basic IE tools and techniques. • SOP • Quality requirements associated with the individual's job function and/or work area • Workplace procedures associated with the candidate's regular technical duties • Relevant health, safety and environment requirements • organizational structure of the enterprise • Lines of communication • Methods of making/recommending improvements. • Reporting procedures
Underpinning Skills	Demonstrates skills to: • Apply problem solving techniques and tools • Apply statistical analysis tools • Apply Visual Management Board/Kaizen Board. • Detect non-conforming products or services in the work area • Document and report information about quality, productivity and other kaizen elements. • Contribute effectively within a team to recognize and recommend improvements in quality, productivity and other kaizen elements. • Implement and monitor improved practices and procedures. • Organize and prioritize activities and items. • Read and interpret documents describing procedures

	• Record activities and results against templates and other prescribed formats.
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

MINERAL EXPLORATION, MINING AND MINERAL PROCESSING



Acknowledgement

We wish to extend thanks and appreciation to the many representatives of business, industry, academe and government agencies who donated their time and expertise to the development of this occupational standard.

We would like also to express our appreciation to Federal TVET Agency, Ministry of Education (MoE), Ministry of Mining who made the development of this occupational standard possible.

This occupational standard was developed in January 2014 at Addis Ababa, Ethiopia.

COMMENT TEMPLATE

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