



Federal Democratic Republic of Ethiopia
OCCUPATIONAL STANDARD

**MINERAL EXPLORATION AND
DEVELOPMENT DRILLING**
NTQF Level II, III, IV & V



*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 Title 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
- Evidence guide

Together all the parts of a Unit Title 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 Title:

- 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 Title(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: Mineral Exploration and Development Drilling		
Occupational Code: MIN MED		
<i>NTQF Level II</i>		
MIN EDD2 01 0114 Follow Workplace Health, Safety and Environment	MIN EDD2 02 0114 Work Effectively in the Drilling Industry	MIN EDD2 03 0114 Setup/Pack up Drill Site
MIN EDD2 04 0114 Conduct Local Risk Control	MIN EDD2 05 0114 Identify and Assess Environmental and Heritage Concerns	MIN EDD2 06 0114 Support Drilling Process
MIN EDD2 07 0114 Assist Mud Rotary Drilling	MIN EDD2 08 0114 Assist Wire Line Core Drilling	MIN EDD2 09 0114 Assist Conventional Core Drilling
MIN EDD2 10 0114 Assist with Air Drilling	MIN EDD2 11 0114 Assist Cable Tool Drilling	MIN EDD2 12 0114 Assist Top/Down Whole Hammer Drilling
MIN EDD2 13 0114 Assist Continuous Flight Auger Drilling	MIN EDD2 14 0114 Support Blow out Prevention Operations	MIN EDD2 15 0114 Assist Underground in-Seam Directional Drilling
MIN EDD2 16 0114 Set up and Prepare for Ground Support	MIN EDD2 17 0114 Cut, Weld and Bend Materials	MIN EDD2 18 0114 Carryout Operational Maintenance
MIN EDD2 19 0114 Operate and Maintain Ancillary Equipment	MIN EDD2 20 0114 Maintain and Monitor Site Quality Standards	MIN EDD2 21 0114 Participate in Workplace Communication
MIN EDD2 22 0114 Work in Team Environment	MIN EDD2 23 0114 Develop Business Practice	MIN EDD2 24 0114 Standardize and Sustain 3S

NTQF Level III**MIN EDD3 01 0114**

Setup and Prepare for Drilling Operations

MIN EDD3 02 0114

Conduct Raise Boring

MIN EDD3 03 0114

Conduct Mud Rotary Drilling

MIN EDD3 04 0114

Conduct Wire Line Core Drilling

MIN EDD3 05 0114

Conduct Conventional Core Drilling

MIN EDD3 06 0114

Conduct Air Drilling

MIN EDD3 07 0114

Conduct Cable Tool Drilling

MIN EDD3 08 0114

Conduct Top/Down-Hole Hammer Drilling

MIN EDD3 09 0114

Conduct Continuous Flight Auger Drilling

MIN EDD3 10 0114

Operate Mud Systems

MIN EDD3 11 0114

Conduct Secondary Blasting

MIN EDD3 12 0114

Apply Blowout Prevention Operational Procedures

MIN EDD3 13 0114

Apply Effective Coal Seam Gas Control Practices

MIN EDD3 14 0114

Apply First Aid

MIN EDD3 15 0114

Monitor Implementation of Work Plan/Activities

MIN EDD3 16 0114

Apply Quality Control

MIN EDD3 17 0114

Lead Workplace Communication

MIN EDD3 18 0114

Lead Small Teams

MIN EDD3 19 0114

Improve Business Practice

MIN EDD3 20 0114

Prevent and Eliminate MUDA

NTQF Level IV

MIN EDD4 01 0114
Manage Non-routine,
Complex Technical
Situations

MIN EDD4 02 0114
Maintain Standard
Procedures and Safe
Working Practices

MIN EDD4 03 0114
Supervise On-site
Operations

MIN EDD4 04 0114
Manage Blasting
Operations

MIN EDD4 05 0114
Conduct Drilling
Operations

MIN EDD4 06 0114
Supervise Geotechnical
Drilling Operations

MIN EDD4 07 0114
Carryout Well Control
and Blowout Prevention

MIN EDD4 08 0114
Supervise Mineral
Exploration/Developmen
t Drilling Operations

MIN EDD4 09 0114
Rig up, Conduct Pre-
spud Operations and
Rig Down

MIN EDD4 10 0114
Apply Site Risk
Management System

MIN EDD4 11 0114
Implement and Monitor
Environmental Policies

MIN EDD4 12 0114
Implement Operational
Plan

MIN EDD4 13 0114
Plan and Supervise the
Mobilization of
Equipment, Crew and
Materials

MIN EDD4 14 0114
Monitor a Safe
Workplace

MIN EDD4 15 0114
Plan and Organize Work

MIN EDD4 16 0114
Migrate to New
Technology

MIN EDD4 17 0114
Establish Quality
Standards

MIN EDD4 18 0114
Develop Individuals and
Team

MIN EDD4 19 0114
Utilize Specialized
Communication Skills

MIN EDD4 20 0114
Manage and Maintain
Small/Medium Business
Operations

MIN EDD4 21 0114
Apply Problem Solving
Techniques and Tools

NTQF Level V

<u>MIN EDD5 01 0114</u> Plan Drilling	<u>MIN EDD5 02 0114</u> Ensure a Safe Workplace	<u>MIN EDD5 03 0114</u> Manage General Drilling Equipment Maintenance
<u>MIN EDD5 04 0114</u> Manage Drilling Induction and Orientation	<u>MIN EDD5 05 0114</u> Manage Drilling Operations	<u>MIN EDD5 06 0114</u> Implement, Monitor, Rectify and Report on Inventory control system
<u>MIN EDD5 07 0114</u> Identify, Implement and Maintain Legal Compliance Requirements	<u>MIN EDD5 08 0114</u> Implement and Maintain Management Systems to Control Risk	<u>MIN EDD5 09 0114</u> Manage Well Completion and Abandonment
<u>MIN EDD5 10 0114</u> Implement and Maintain Environmental Management Plan	<u>MIN EDD5 11 0114</u> Manage Operational Plan	<u>MIN EDD5 12 0114</u> Manage Project Quality
<u>MIN EDD5 13 0114</u> Facilitate and Capitalize on Change and Innovation	<u>MIN EDD5 14 0114</u> Establish and Conduct Business Relationships	<u>MIN EDD5 15 0114</u> Manage Continuous Improvement Process (Kaizen)

NTQF Level II

Occupational Standard: Mineral Exploration and Development Drilling Level II	
Unit Title	Follow Workplace Health, Safety and Environment Procedures
Unit Code	<u>MIN EDD2 01 0114</u>
Unit Descriptor	This unit covers the entry level health, safety, site access and environmental knowledge and skills required by utility workers and entrants to the drilling industry prior to commencement (where possible) on a drill site.

Elements	Performance Criteria
1. Identify drilling industry hazards, assess associated risk and implement control measures.	<p>1.1 Health and safety hazards in the workplace are identified.</p> <p>1.2 The risk from each hazard is assessed.</p> <p>1.3 Hazard control procedures/practices applying the hierarchy of control are followed.</p> <p>1.4 Tag out/lock out procedure is followed.</p> <p>1.5 Personal protective equipment is used and cared for as required.</p> <p>1.6 Safe manual handling practice is used.</p> <p>1.7 Hazardous materials are handled/ used, stored, transported and disposed of in accordance with Material Safety Data Sheet (MSDS) requirements.</p> <p>1.8 Measures are implemented to control risks in line with safe work and safe operating procedures and duty of care requirements.</p> <p>1.9 Legal requirements such as duty of care are complied.</p> <p>1.10 All drilling site safety signs are complied.</p>
2. Respond to an emergency / potential emergency situation.	<p>2.1 An emergency occurred is recognized.</p> <p>2.2 A potential emergency is identified.</p> <p>2.3 The hazard(s) is/are assessed and the appropriate action/ emergency procedure are determined.</p> <p>2.4 The appropriate alarm is raised and required help got.</p> <p>2.5 Appropriate communication equipment is used.</p> <p>2.6 The appropriate emergency procedure is followed.</p> <p>2.7 Fire is control/extinguish if appropriate.</p> <p>2.8 Danger and required response, rendering assistance to personnel are assessed as required.</p> <p>2.9 Basic first aid is applied as required.</p> <p>2.10 Required records and reporting are completed.</p>

<p>3. Implement environmental, drill site access and heritage requirements.</p>	<p>3.1 Work is done within conditions granting access to drill site.</p> <p>3.2 Potential environmental hazards are recognized from drilling site operation.</p> <p>3.3 Procedures/practices are followed to control/minimize environmental incidents.</p> <p>3.4 Protected areas/objects are recognized and action is taken to ensure they are not interfered with or damaged.</p> <p>3.5 Any breaches are reported to the appropriate person and recorded as required.</p>
<p>4. Make suggestions to enhance task/job-specific safety.</p>	<p>4.1 Task and/or job-specific occupational health and safety issues are raised with appropriate people in accordance with workplace procedures and relevant occupational health and safety legislative requirements.</p> <p>4.2 Contribute to participative/consultative arrangements for occupational health and safety improvement in the workplace within organizational procedures and the scope of responsibilities and competencies.</p> <p>4.3 Hazards in work area are recognized and appropriate people notified in line with organizational occupational health and safety policies and procedures.</p> <p>4.4 Procedures are implemented to control risks using the hierarchy of controls and in accordance with work role and organizational procedures.</p> <p>4.5 Record and report are given to appropriate people in accordance with workplace procedures when non-routine hazards arise.</p>

Variable	Range
Office hazards	<p>Includes:</p> <ul style="list-style-type: none"> • Trip hazards/steep and slippery stairs • Wet areas • Blockages of fire evacuation and emergency exits • Inappropriate office ergonomics • Office layout/VDU position/photocopier • Passive smoking • Electricity/overloaded power sockets/unsafe extension leads • Poor ventilation • Poor lighting • Noise • Poor storage practices (manual handling) • Hazardous substances/building materials/chemicals (asbestos, formaldehyde) • Lack of first aid materials or trained first aider • Workshop/store/laboratory hazards: <ul style="list-style-type: none"> ➤ Dust, swarf, rubbish

	<ul style="list-style-type: none"> ➤ Vapors and fumes ➤ Hazardous chemicals ➤ Flying particles (angle grinders) ➤ Compressed gases ➤ Flash from welding/cutting operation ➤ Manual handling (lifting and carrying) ➤ Mechanical handling (forklifts, overhead gantry crane, self loading crane pallet truck) ➤ Power tools and electrical sources including power leads and sockets ➤ Contaminated samples ➤ Poor storage practices (manual handling) ➤ Noise/light/ventilation ➤ Slips/trips/wet areas ➤ Ignition sources near flammable goods 		
The workplace	<p>includes:</p> <ul style="list-style-type: none"> • Office • Workshop • Stores area • Drill plant operational area • Surrounding environment 		
Personal protective equipment	<p>may include:</p> <ul style="list-style-type: none"> • Safety helmet - possibly with sun brim • Safety boots • Suitable clothing • Hearing protection • Safety glasses • Gloves (as required by the situation) • Dust mask • Sun screen (UV protection) • Barrier creams • Safety harness and fall arrest equipment • Face shield • Safety goggles • Canister respirators • Air feed respirators • Chemical respirators • Welding helmet (arc welding) • Welding goggles (oxy/acetylene) • Welding gloves • Wrist support straps • Chemical resistant gloves • Gas level monitors (e.g. nauseous, poisonous, flammable) • High visibility vests/belts 		
Drilling site hazards	<p>Include:</p> <ul style="list-style-type: none"> • Utility hazards (power lines, (overhead and underground) gas, telephone, water sewer, drainage lines) • Flammable materials • Confined spaces sample delivery hoses 		
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	<ul style="list-style-type: none"> • Noise • Dust • Poor lighting • Working in the dark (distance/depth perception, differing light conditions glare and vision) • Hazardous substances/building materials/chemicals (asbestos, formaldehyde) • Manual and mechanical handling (lifting and carrying) • Unstable ground
Emergencies	<p>may include:</p> <ul style="list-style-type: none"> • Fire/explosion • Chemical emergency • Injury • Health emergency/illness • Use of emergency shutdown button • Collapse/slip or potential collapse/slip of mine workings/embankments • Cyclone threat • Flood threat • Bush fire threat
Fire extinguishing /control	<p>may include:</p> <ul style="list-style-type: none"> • Recognition of type of fire/identification of control method • Selection and use of fire extinguishers (water, foam, dry chemical, carbon dioxide) • Selection and use of fire hoses • Use of semi-automated or automated fire suppression systems
Basic first aid	<p>is limited to minor, first response assistance such as:</p> <ul style="list-style-type: none"> • DRABC (danger, response, airway, breathing, circulation) • Initial response for heat stress/heat exhaustion/heat stroke • Hypothermia/frost bite
Access conditions	<p>May include:</p> <ul style="list-style-type: none"> • Gates and fences • Station roads (following, dealing with, staying on where possible) • Stock watering points, windmills, tanks • Flora and fauna reserves • Aboriginal reserves • Die back areas • Quarantine areas • Closed roads • Local shire/council road restrictions/closures • Mine site access restrictions and permission (prior access approval required) • Non-trafficable road conditions
Environmental hazards	<p>Include:</p> <ul style="list-style-type: none"> • Exposure to radiation • Heat

	<ul style="list-style-type: none"> • Hypothermia • Harsh environment • Bushfire (restrictions/fire bans) • Gas (in mines) • Cyclones and flooding • Lightning • Snakes and insects • Pollution and contamination (sites and/or samples) • Waste disposal • Spoil disposal • Disposal/leakage/spillage of fuel/oil/materials • Dust • Noise (urban environments) • Rotating machinery • Hazards with brake out tongs, stilsons - hand injuries • In hole gases and fluids • Fittings, sprockets cables and pulleys (hoisting operations) • Winch ropes • Compressed air (high pressure hoses) • Sample delivery hoses • Bursting hydraulic and drilling fluid lines • Tripping/slipping/wet and muddy decks and surfaces • Dropped objects (falling rods and tools) • Hand and power tools • Heat sources (hot surfaces) • Electrical or operational fire • Drilling fluids, fuels and chemicals • Electric shock • Moving equipment (trucks and traffic) • Sample returns • Removing core from core barrels • Alcohol and illicit drugs • Some prescription medications • Working in remote places • Fatigue when travelling long distances • Poor personal hygiene/camp practices (rubbish disposal, toilet facilities) • Road traffic hazards • Contaminated site/sample hazards (permit required) • Hot work hazards (permit required)
Protected areas	<p>include:</p> <ul style="list-style-type: none"> • Structures or other 'improvements' such as might be protected by a Heritage Order • relics, carvings, burial sites, painting, tools • Flora and fauna reserves/quarantine area

Participative/consultative arrangements	<p>include:</p> <ul style="list-style-type: none"> • Tool box meeting • Shift change meetings • Drill program briefings/debriefings • Meetings scheduled by the client • Site familiarization 		
Hazard recognition and control methods	<p>include:</p> <ul style="list-style-type: none"> • Job Safety Analysis (JSA) (e.g. Spot the hazard, Assess the risk, Make the changes (SAM), stop/think/go) • Risk assessment models (e.g. risk assessment calculator tools/cards) • Safety signs and colour codes • Materials labels and Material Safety Data Sheets (MSDS) • Safe work procedures <p>The hierarchy of control is the preferred order of risk control measures from most to least preferred, that is:</p> <ul style="list-style-type: none"> • Elimination - i.e. remove the source of the risk • Substitution - i.e. use a less risky material, or piece of equipment • Engineering controls - i.e. modify the equipment/process to reduce the risk/provide 'isolation' - shielding and barriers • Administrative controls - i.e. modify the procedures to reduce the risk, use information, instruction, training and supervision • Personal protective equipment - i.e. use relevant personal protective equipment to protect from the hazard 		
Situations requiring the application of tag out/lock out procedures	<p>May include:</p> <ul style="list-style-type: none"> • Vehicle, plant and equipment maintenance/repair/servicing • Maintenance, repair and service of equipment and plant that holds or may hold stored energy • Maintenance of plant and equipment when work involves work at height up the drilling rig mast structure • Identification and isolation of plant/equipment that is hazardous, unserviceable or damaged 		
Hazardous substances	<p>may include:</p> <ul style="list-style-type: none"> • Battery acid • Fuel (e.g. petrol, diesel) • Industrial gases • Drilling fluids and/or additives • Solvents • A&B foam • Cement and cement additives • PVC glue and primer • Oils and greases 		
Devices	<p>may include:</p> <ul style="list-style-type: none"> • Radio contact (HF, VHF or UHF) • Phone contact (land line, digital and CDMA mobile or satellite) • Plant/equipment emergency shutdown devices • Gas monitors (PID meters) 		
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	<ul style="list-style-type: none"> • Emergency Position Indicating Radio Beacon (EPIRB) • Emergency sirens
Environmental hazards	<p>may include:</p> <ul style="list-style-type: none"> • Waste disposal • Spoil disposal • Disposal/leakage/spillage of fuel/oil/materials • Dust • Noise • Plant/vehicle movement/wash down/clean down

Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • Follow direction and work in a safe manner • Compliance with occupational health and safety policies and procedures • Compliance with access requirements • Compliance with environmental and heritage policies and procedures
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • Duty of care • Effects and implications of the use of alcohol, prescription drugs and illegal drugs • Use and care of required personal protective equipment • Clothing requirements for weather extremes • Common hazards on drill sites • Risk assessment models • Application of hierarchy of control • Tag out/lock out procedures • Safety signs and their meaning • Sanitation requirements • Personal hygiene requirements in a team environment • Emergency procedures • Procedures for obtaining emergency medical (or other) assistance • Basic first aid • Fire and fire extinguishment/control • Use of emergency shut down • Use of communication equipment • Impact and requirements of environment and heritage legislation and regulations as shown through policies and procedures • Interpretation of Material Safety Data Sheet (MSDS)
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • Use and care of personal protective equipment • Application of Job Safety Analysis (JSA) • Interpret signs • Complete reports as required • Use communication equipment

	<ul style="list-style-type: none"> • Operate shut down devices
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: <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level II	
Unit Title	Work Effectively in the Drilling Industry
Unit Code	<u>MIN EDD2 02 0114</u>
Unit Descriptor	This unit covers working effectively in the drilling industry. It includes following safe manual handling procedures, routinely practicing good housekeeping, completing pre-start checks and refuelling vehicles and plant and driving vehicles. The work required in this unit relates to the National Standard for High Risk Work. This unit is appropriate for those assisting with a variety of tasks within drilling.

Elements	Performance Criteria
1. Follow safe manual handling procedures.	<p>1.1 Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2 Load to be moved is assessed.</p> <p>1.3 Lift transport route and lay down position are planned for stability.</p> <p>1.4 Necessary manual handling aids are used safely and efficiently and assistance is sought where required.</p>
2. Routinely practice good housekeeping.	<p>2.1 All relevant housekeeping areas are kept clean, neat and tidy.</p> <p>2.2 All tools and equipment are kept clean and stored in the correct place when not in use.</p> <p>2.3 Possible hazards are identified from poor housekeeping.</p> <p>2.4 Good housekeeping practice is implemented.</p> <p>2.5 Equipment problems are reported.</p>
3. Complete pre-start checks.	<p>3.1 Walk around plant/equipment/vehicle checking all items are made serviceable and in good condition and documentation is completed as required by company procedures.</p> <p>3.2 Top up fluids are checked as required.</p> <p>3.3 All guards and safety devices are checked in place and serviceable.</p> <p>3.4 All personnel are ensured to clear or in a safe position before starting.</p> <p>3.5 Required records and reporting are completed.</p>
4. Refuel vehicles and plant.	<p>4.1 No-smoking zone is enforced while refueling.</p> <p>4.2 Correct fuel is selected.</p> <p>4.3 Engine is refueled in accordance with company/site procedures.</p> <p>4.4 Any spills are cleaned up.</p>

	<p>4.5 Fuel storage area is left clean and tidy.</p> <p>4.6 Remaining fuel supply is noted and required records/reporting are completed.</p>
5. Drive vehicle.	<p>5.1 Vehicle roadworthiness and load distribution and security are checked before commencing.</p> <p>5.2 Potential vehicle hazards are identified from road trip and relevant hazard minimization procedures are load and implemented.</p> <p>5.3 Trip is planned to maximize safety and minimize cost.</p> <p>5.4 Vehicle is driven in compliance with local conditions and road/site rule.</p> <p>5.5 Wheel is changed as required.</p>

Variable	Range
Compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> legislative, organisation and site requirements and procedures manufacturer's guidelines and specifications Relevant Ethiopian standards Employment and workplace relations legislation Equal Employment Opportunity and Disability Discrimination legislation
Manual handling aids	<p>may include:</p> <ul style="list-style-type: none"> truck mounted cranes (e.g. HIAB) overhead cranes jib cranes fork lift trucks Integrated Tool carrier (IT)
Housekeeping areas	<p>may include:</p> <ul style="list-style-type: none"> rig and environs fuel dumps chemical storage camp environs lay down and storage areas workshop, store, yard vehicles crib rooms offices ablution facilities
Refuelling	<p>may include:</p> <ul style="list-style-type: none"> diesel/petrol bowser/drum fire hazards - smoking, mobile phones, hot equipment
Vehicles	<p>may include:</p> <ul style="list-style-type: none"> two/all wheel drive heavy rigid trucks

	<ul style="list-style-type: none"> • articulated vehicles • tracked vehicles
Potential vehicle hazards	<p>may include:</p> <ul style="list-style-type: none"> • hazardous driving conditions • jacking on uneven/uncompacted ground • different wheel types

Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence of:</p> <ul style="list-style-type: none"> • the requirements, procedures and instructions for working safely in the drilling industry • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of housekeeping, pre-start checks, vehicle refuelling and driving vehicles • working with others to undertake and complete the housekeeping and OHS procedures that meet all of the required outcomes • consistent timely completion of OHS procedures, housekeeping, pre-start checks, refuelling and driving vehicles that safely, effectively and efficiently meet the required outcomes
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • housekeeping standards and the contribution of housekeeping to safety and efficiency • pre-start check procedures • driving hazards • fuels and fuelling hazards • jacking and wheel changing hazards and techniques • manual handling techniques
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures for working effectively in the drilling industry • apply skills for safe lifting • demonstrate literacy skills to complete required reporting • demonstrate basic mathematical skills to make calculations relating to linear measurements, volumes weights and distances
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and Equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competency may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Mineral Exploration and Development Drilling Level II	
Unit Title	Setup/Pack up Drill Site
Unit Code	MIN EDD2 03 0114
Unit Descriptor	This unit covers the setting up and packing up of drill sites in the drilling industry. It includes: planning and preparing for setting up and packing up of drill sites; assisting the driller to set up drill rig; setting up and dismantling ancillary equipment; and packing up drill site. This unit is appropriate for those working in drillers assistant roles, at worksites within: Civil construction, Coal mining, Drilling, Extractive industries, and Metalliferous mining.

Elements	Performance Criteria
1. Plan and prepare for setting up and packing up of drill sites	<p>1.1 Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2 Work instructions are obtained, confirmed and applied for the allocated task.</p> <p>1.3 All potential hazards are identified, managed and reported.</p> <p>1.4 Coordination requirements are resolved with others at the site prior to commencing and during work activities.</p> <p>1.5 Working order of required safety equipment is tested.</p> <p>1.6 Warning signs and barriers are erected and observed as directed.</p> <p>1.7 Materials are stored as directed to minimize hazards and contamination.</p>
2. Assist driller to set up drill rig	<p>2.1 A range of instructions on work scheduling are carried out in logical sequence.</p> <p>2.2 Unloading rig and equipment are assisted using a range of measures to ensure no damage.</p> <p>2.3 Tools and/or equipment needed to complete the hole in the work area are set out.</p> <p>2.4 Appropriate weather precautions are taken for equipment and stores.</p>
3. Set up and dismantle ancillary equipment	<p>3.1 Ancillary equipment is set up and dismantled in accordance with instructions.</p> <p>3.2 Connecting services are provided to and from equipment in accordance with instructions.</p> <p>3.3 A pre-start check is carried out in accordance with requirements.</p>
4. Pack up drill site	<p>4.1 Area is cleaned to policies and procedures.</p> <p>4.2 Equipment is loaded and secured as directed.</p> <p>4.3 Waste and unwanted materials are removed from site.</p>

	4.4 Tools and equipment are cleaned, maintained and stored.
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Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Work instructions	<p>may come from:</p> <ul style="list-style-type: none"> • briefings, handovers, plans and work orders and may be written or verbal, formal or informal and may include: <ul style="list-style-type: none"> ➤ nature and scope of tasks ➤ specifications ➤ quality of finished works ➤ achievement targets ➤ operational conditions ➤ obtaining of 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 ➤ contamination control requirements ➤ environmental control requirements ➤ barricade and signage requirements
Hazards	<p>may include:</p> <ul style="list-style-type: none"> • previous usage (e.g. builders or demolition residue) • electric wires (overhead or underground) • telephone lines or fiber optic cables • gas pipes • pressurized water pipes • drains for water and sewer • overhead branches • available working space or confined space • environmental hazards, including: <ul style="list-style-type: none"> ➤ contaminated soil ➤ toxic substances ➤ in-hole gas ➤ wind direction and ➤ atmospheric contaminants, including dust and fumes
Coordination requirements	<p>may include</p> <ul style="list-style-type: none"> • driller • other equipment operators

	<ul style="list-style-type: none"> • maintenance personnel • supervisors • site personnel
Ancillary equipment	<p>may include:</p> <ul style="list-style-type: none"> • compressor • pumps • grout pump • mixing tanks • sample collection hopper/skip • support vehicle • water tank, temporary reservoirs, and pipelines • HF radio aerial, microwave dish • cyclones • sample storage • down hole test or installation equipment (packers, survey, water pressure test equipment, sampling devices) • core boxes • drill string components • tools

Evidence Guide

Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence of:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions for setting up and packing up of drill sites • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of the setting up and packing up of drill sites • working with others to undertake and complete the setting up and packing up of drill sites that meets all of the required outcomes • consistent timely completion of the setting up and packing up of drill sites that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • occupational health and safety procedures, including site and equipment safety requirement • importance of drill pad stability and rig alignment • safe storage requirements and procedures for hazardous substances • environmental requirements and procedures, including reducing: contamination and pollution; and containing, dispersing and disposing of waste fluids • equipment characteristics, technical capabilities and limitations • operational and maintenance procedures • basic geological and technical data • extreme weather precautions • how to clean, dig and protect and mud pits and drains, where required

Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures • apply manual and mechanical handling techniques • apply communication by hand signals for vehicle positioning and mast raising • apply decontamination procedures for rig 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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level II	
Unit Title	Conduct Local Risk Control
Unit Code	MIN EDD2 04 0114
Unit Descriptor	This unit covers the conduct of local risk control in resources and infrastructure industries. It includes identifying hazards; assessing risk and identifying unacceptable risk; identifying, assessing and implementing risk treatments; and completing records and reports.

Elements	Performance Criteria
1. Identify hazards	<p>1.1 Compliance documentation relevant to conducting local risk control is accessed, interpreted and applied.</p> <p>1.2 Work area conditions are inspected to identify potential hazards in the workplace.</p> <p>1.3 Existing procedures are applied to deal with recognized hazards.</p> <p>1.4 The type and scope of unresolved hazards and their likely impact are recognized.</p>
2. Assess risk and identify unacceptable risk	<p>2.1 Consequence is assessed and determined if the event should occur.</p> <p>2.2 Likelihood of the event is considered and determined.</p> <p>2.3 Criteria is identified for the acceptability/unacceptability of the risk or sourced from the appropriate party.</p> <p>2.4 Risk against criteria is assessed to identify if it warrants 'unacceptable risk' status and either action or referred to the appropriate party.</p>
3. Identify, assess and implement risk treatments	<p>3.1 All possible risk treatment options are identified and considered.</p> <p>3.2 Options are identified by preliminary analysis and consideration of possible options.</p> <p>3.3 Options, including the identification of resource requirements are analyzed.</p> <p>3.4 Most appropriate action is selected for dealing with the situation.</p> <p>3.5 The course of action is planned and prepared in detail and required resources are acquired/ obtained.</p> <p>3.6 The risk treatment is implemented.</p> <p>3.7 Risk management processes are reviewed.</p>
4. Complete records and reports	<p>4.1 Information on the course of action and implementation is communicated.</p> <p>4.2 Records and reports for hazards and actions are completed from personal risk assessment as specified by legislation and site requirements.</p>

Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organization and site requirements and procedures • Ethiopian standards • code of practice • Employment and Workplace Relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Risk	<p>is defined as:</p> <ul style="list-style-type: none"> • The chance of something happening that will have an impact upon objectives. It is measured in terms of consequences and likelihood
Hazards	<p>is defined as:</p> <ul style="list-style-type: none"> • a source of potential harm or a situation with a potential to cause loss <p>may include:</p> <ul style="list-style-type: none"> • equipment • stored energy • methods • plans • people • the work environment
Consequence	<p>is defined as:</p> <ul style="list-style-type: none"> • the outcome of an event or situation expressed qualitatively or quantitatively, being a loss, injury, disadvantage or gain
Likelihood	<p>is used as:</p> <ul style="list-style-type: none"> • a qualitative description of probability and frequency
Criteria	<p>must be determined by:</p> <ul style="list-style-type: none"> • the organization's internal policy, goals and/ or objectives in reference to relevant legislation
Risk treatment options	<p>may include:</p> <ul style="list-style-type: none"> • eliminating the hazard • substitution • engineering controls • administrative controls (procedures, etc) • personal protective equipment.
Risk treatment	<p>is defined as:</p> <ul style="list-style-type: none"> • selection and implementation of appropriate options for dealing with risk
Records and reports	<p>may include:</p> <ul style="list-style-type: none"> • hazard reporting forms • supervisor/deputy/OCE reports • incident reports • near miss reports • shift reports • JSAs • Take 5 and step Back
Frequency	is defined as:

	<ul style="list-style-type: none"> • a measure of likelihood expressed as the number of occurrences of an event in a given time
Probability	<p>is defined as:</p> <ul style="list-style-type: none"> • the measure of the chance of occurrence expressed as a number between 0 and 1

Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • the requirements, procedures and instructions to conduct local risk control • implementation of requirements, procedures and techniques for the safe, effective and efficient conduct of local risk control • working with others to undertake and conduct of local risk control that meets all of the required outcomes • consistent timely completion of conducting local risk control that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • risk management processes and methods, including: identifying hazards, assessing risks, determining acceptability of risks, identifying controls • specific worksite risk management procedures • specific worksite safety systems information • specific worksite communication, reporting and recording procedures
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures • speak clearly and directly, listen carefully to instructions and information, respond to and clarify directions • collect, analyse and organise information • access, interpret and apply site information • work with other team members • apply teamwork to a range of situations • apply problems solving skills • apply decision making skills • show initiative in adapting to changing work conditions or contexts • apply time management • take responsibility for self organisation of work priorities • apply mathematical skills to perform a basic risk ranking of hazards • interpret and apply Material Safety Data Sheets (MSDS)
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and Equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competency may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Mineral Exploration and Development Drilling Level II	
Unit Title	Identify and Assess Environmental and Heritage Concerns
Unit Code	MIN EDD2 05 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	<p>1.1. Compliance documentation relevant to environmental and heritage issues is accessed, interpreted and applied.</p> <p>1.2. Environmental and heritage issues are identified and reported to relevant authority according to site procedures, regulations and other compliance requirements.</p> <p>1.3. The nature of environment and/or heritage concerns is accurately identified from site information.</p> <p>1.4. Emergency is planned enact.</p> <p>1.5. Relevant isolation procedures are enacted according to relevant requirements.</p> <p>1.6. Contaminants are removed and/or contained upon identification.</p>
2. Assess and respond to environmental and heritage concerns	<p>2.1. Site on receipt of relevant clearances is inspected to confirm environment and/or heritage issues.</p> <p>2.2. All required records and documentation are completed accurately and promptly.</p>
3. Work within environmental and heritage guidelines	<p>3.1. Environment and heritage issues are adhered.</p> <p>3.2. Environmental and heritage guidelines are conformed in the organization of work activities.</p> <p>3.3. Appropriate authorities of environmental and/or heritage issues are contacted and informed.</p>

Variable	Range
Relevant Compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • Relevant Ethiopian standards • environmental agencies regulations • Environmental Protection Act • isolation procedures • manufacturer's specifications and recommendations • mine safety and health legislation and regulations • OHS legislation • site regulations, requirements and procedures

Environmental and heritage issues	<p>may include:</p> <ul style="list-style-type: none"> • 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	<p>may include:</p> <ul style="list-style-type: none"> • environmental authorities • experts (scientific, historic, biological) • local Aboriginal leaders
Contaminants	<p>may include:</p> <ul style="list-style-type: none"> • diseased vegetation • leakage into ground water • oil spill • saline water

Evidence Guide			
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence of:</p> <ul style="list-style-type: none"> • 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	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • 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 		
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	<ul style="list-style-type: none"> • OHS procedures • open cut procedures • operational procedures and checks • site procedures • site safety requirements
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation 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 • organise 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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level II	
Unit Title	Support Drilling Process
Unit Code	MIN EDD2 06 0114
Unit Descriptor	This unit covers supporting the drilling process in resources and infrastructure industries. It includes: planning and preparing for supporting the drilling process, operating ancillary equipment, cleaning all equipment at drilling site, maintaining levels of supplies, and performing basic measurement and calculations. This unit is appropriate for Coal mining, Drilling, Extractive industries and Metalliferous mining

Elements	Performance Criteria
1. Plan and prepare for supporting the drilling process	<p>1.1 Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2 Work instructions for the allocated task are obtained, confirmed and applied.</p> <p>1.3 All potential hazards are identified, managed and reported.</p> <p>1.4 Coordination requirements are resolved with others at the site prior to commencing and during work activities.</p>
2. Operate ancillary equipment	<p>2.1 Ancillary equipment is started-up, run, and closed down.</p> <p>2.2 Faults and record findings are identified.</p>
3. Clean all equipment at drilling site	<p>3.1 Clean working conditions are maintained to minimize any associated safety hazards.</p> <p>3.2 Vehicles are cleaned and stored routinely after use to requirements.</p> <p>3.3 Machines and equipment are maintained in a clean and serviced condition at all times.</p> <p>3.4 Cleaning equipment is used safely and effectively.</p> <p>3.5 Approved instructions and occupational health and safety requirements on the use of hazardous chemicals are applied for cleaning and drilling.</p> <p>3.6 Ensure that all cleaning equipment is kept in good working condition.</p>
4. Maintain levels of supplies	<p>4.1 Driller informed on current stock levels is kept.</p> <p>4.2 Availability of consumable items in the workplace is checked regularly.</p> <p>4.3 Record keeping, stock counts and paper work are completed as required.</p>
5. Perform basic measurement	<p>5.1 Tape measure is read accurately to carry out simple measurements.</p> <p>5.2 Simple calculations and measurements are carried out.</p>
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t and calculations	5.3 All reports are recorded legibly.
6. Carry out basic operator maintenance	6.1 Hazards, and methods of minimizing hazards are identified in conducting maintenance, particularly in the field. 6.2 Minor repairs and replacements are carried out as required. 6.3 Minor breakdowns and bogging are overcome using recovery techniques as required. 6.4 Vehicle washing and housekeeping are carried out regularly.

Variable	Range
Relevant compliance documentation	may include: <ul style="list-style-type: none"> • legislative, organisational and site requirements and procedures • manufacturer's guidelines and specifications • Relevant Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Work instructions	may come from: <ul style="list-style-type: none"> • briefings, handovers, plans and work orders and may be written or verbal, formal or informal and may include: <ul style="list-style-type: none"> ➢ nature and scope of tasks ➢ specifications ➢ quality of finished works ➢ achievement targets ➢ operational conditions ➢ obtaining of 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 ➢ contamination control requirements ➢ environmental control requirements ➢ barricade and signage requirements
Hazards	may include: <ul style="list-style-type: none"> • spread of contaminants as a result of drilling or cleaning processes • working in proximity to drilling rig • use of high pressure air for drilling operations • entanglement in rotating pipes • string makeup and breakout hazards • drilling equipment and down-hole tools
Coordination requirements	may include: <ul style="list-style-type: none"> • driller • other equipment operators

	<ul style="list-style-type: none"> • maintenance personnel • supervisors • mine personnel
Ancillary equipment	<p>may include:</p> <ul style="list-style-type: none"> • generators (welding/lighting) • pumps • compressors • high pressure cleaning equipment (gernies) • power tools • hand tools • grout mixing • drill fluid (mud) mixing equipment
Cleaning equipment	<p>may include:</p> <ul style="list-style-type: none"> • pressure cleaning • chemical cleaning • manual cleaning • abrasive mechanical cleaning
Calculations and measurements	<p>may include:</p> <ul style="list-style-type: none"> • diameters of drill bits, casing, hole • rod volumes • hole volumes • tank volumes • annular volumes • length of casing

Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence of:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions for supporting the drilling process • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of support of the drilling process • working with others to undertake and complete the support of the drilling process that meets all of the required outcomes • consistent timely completion of the support of the drilling process that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • site and equipment safety requirements • equipment characteristics, technical capabilities and limitations • operational and maintenance procedures • layout of basic hydraulic circuits • hydraulic and pneumatic systems • basic geological and technical data • environmental requirements and procedures • team roles and objectives • interpretation and prediction techniques using graphical representation, e.g. maps and diagrams • requirements to ensure cost effective operations, including work

	practices that limit damage to equipment and minimise use of consumables
Underpinning Skills	Demonstrate skills to: <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures • operate pressure cleaners • apply basic operator servicing and maintenance of plant and vehicles • apply communication procedures • use lifting equipment • identify weathered and fresh rock
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: <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level II	
Unit Title	Assist Mud Rotary Drilling
Unit Code	MIN EDD2 07 0114
Unit Descriptor	<p>This unit covers assisting with mud rotary drilling in resources and infrastructure industries. It includes planning, preparing for and assisting with the drilling process, handling samples, mixing drilling fluids, carrying out basic maintenance of tools and equipment.</p> <p>Rotary mud drilling is used for environmental, geotechnical, mineral exploration and water well drilling. This unit is appropriate for those working in driller's assistant roles, at worksites within: Civil construction, Coal mining, Drilling, Extractive industries and Metalliferous mining.</p>

Elements	Performance Criteria
1. Plan and prepare for assisting with mud rotary drilling.	<p>1.1 Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2 Work instructions are obtained, confirmed and applied for the allocated task.</p> <p>1.3 All potential hazards are identified, managed and reported.</p> <p>1.4 Coordination requirements are resolved with others at the site prior to commencing and during work activities.</p> <p>1.5 Rotary drilling equipment and all associated tools, sampling devices and connecting equipment are loaded, unloaded, moved, handled, used and stored.</p> <p>1.6 Pipe racks are set up and stabilized.</p> <p>1.7 All necessary personal protective equipment and protective clothing is worn when assisting with rotary mud drilling.</p>
2. Support the rotary mud drilling process.	<p>2.1 Bits, reamers and stabilizers are fitted and removed to and from the drill string.</p> <p>2.2 Drill string is prepared in readiness for tripping and drilling.</p> <p>2.3 Drill pipe and collars are added and removed from the drill string.</p> <p>2.4 Drill pipe, collars, bits, threads and associated equipment are inspected for damage.</p> <p>2.5 Housekeeping and site safety measures are observed while supporting rotary mud drilling operations.</p> <p>2.6 Pipe and casing handling equipment is used according to required procedures.</p>
3. Handle samples.	<p>3.1 Necessary safety precautions are taken when handling potentially hazardous samples.</p> <p>3.2 Disturbed samples are obtained and/or laid out in accordance</p>

	<p>with workplace, drilling sector or site procedures.</p> <p>3.3 Samples are bagged, properly labeled and stored for transport according to requirements.</p> <p>3.4 Sampling tools are cleaned and serviced.</p> <p>3.5 Undisturbed samples are stored for transport in accordance with standard procedures.</p>
4. Mix drilling fluids.	<p>4.1 Appropriate protective clothing is worn.</p> <p>4.2 Labels are checked and safety information, hazard codes and Material Safety Data Sheets (MSDS) read and interpret.</p> <p>4.3 Correct mixing procedure is applied for the drilling fluid.</p> <p>4.4 Storage of drilling mud components and additives is carried out safely and according recommendations.</p> <p>4.5 Basic tests on the fluid are performed and the results are recorded and reported.</p>
5. Carry out basic maintenance of tools and equipment.	<p>5.1 Inspections and routine checks on ancillary equipment such as mud pumps, water delivery pumps and mud hoppers are performed.</p> <p>5.2 Inspections and basic maintenance pipe handling equipment are performed.</p> <p>5.3 Occupational health and safety procedures are observed in carrying out equipment maintenance.</p>

Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organisation and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Work instructions	<p>may come from:</p> <ul style="list-style-type: none"> • briefings, handovers, plans and work orders and may be written or verbal, formal or informal and may include: <ul style="list-style-type: none"> ➢ nature and scope of tasks ➢ specifications ➢ quality of finished works ➢ achievement targets ➢ operational conditions ➢ obtaining of permits required ➢ site layout ➢ out of bounds areas ➢ worksite inspection requirements ➢ lighting conditions

	<ul style="list-style-type: none"> ➤ plant or equipment defects ➤ hazards and potential hazards ➤ coordination requirements or issues ➤ contamination control requirements ➤ environmental control requirements ➤ barricade and signage requirements
Hazard	<p>may include:</p> <ul style="list-style-type: none"> • release of gases from formation or samples obtained • spread of contaminants as a result of drilling or cleaning processes • change in the chemistry of contaminants as a result of drilling and recovery of the core samples • working in proximity to drilling rig • entanglement in rotating pipes • string makeup and breakout hazards • hazards with the use of grout mixers, pumps
Coordination requirements	<p>may include:</p> <ul style="list-style-type: none"> • drill team members • other equipment operators • maintenance personnel • supervisors • worksite personnel
Personal protective equipment	<p>includes:</p> <ul style="list-style-type: none"> • steel-capped boots and hardhat • gloves • dust mask • eye and hearing protection • general protective and reflective clothing
Pipe and casing handling equipment	<p>may include:</p> <ul style="list-style-type: none"> • foot clamps (hydraulic or manual) • stilsons • break-out wrench • lifting plugs • C Spanner • clam shell
Samples	<p>may include:</p> <ul style="list-style-type: none"> • disturbed/undisturbed samples • sludge samples
Label information	<p>may include:</p> <ul style="list-style-type: none"> • Project number • Bore number • Depth interval • Sample description • Sampling method
Drilling fluids and additives	<p>may include:</p> <ul style="list-style-type: none"> • polymers • bentonite • water/oil

	<ul style="list-style-type: none"> soluble oil lost circulation material aerated mud
Basic tests on drilling fluid	<p>may include:</p> <ul style="list-style-type: none"> viscosity mud weight sand content pH salinity filter press
Record keeping documents	<p>may include:</p> <ul style="list-style-type: none"> note book plastic bags (write on) undisturbed tubes bore logs

Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> knowledge of the requirements, procedures and instructions for assisting with mud rotary drilling implementation of requirements, procedures and techniques for the safe, effective and efficient assisting with mud rotary drilling working with others to undertake and complete the mud rotary drilling tasks that meets all of the required outcomes consistent timely completion of assisting with mud rotary drilling that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> reasons for identification and care of samples including storage and transport occupational health, safety and environment issues use of Material Safety Data Sheets (MSDS) types of mud pumps and their applications
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> apply legislative, organisation and site requirements and procedures apply procedures for operation of ancillary equipment such as mud pumps, water supply pumps mud hoppers and solids control equipment apply basic maintenance procedures for mud and/or water delivery pumps
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and Equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> Interview / Written Test Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competency may be assessed in the work place or in a simulated work place setting.</p>
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Occupational Standard: Mineral Exploration and Development Drilling Level II	
Unit Title	Assist Wire Line Core Drilling
Unit Code	MIN EDD2 08 0114
Unit Descriptor	<p>This unit covers the technical knowledge and practical skills, specific to assisting with operations using wire line core drilling at the driller's assistant level. It will be complemented by other general units that cover the more generic aspects of supporting drilling operations.</p> <p>This unit applies primarily to the geotechnical and mineral exploration sectors, and any other sectors using wire line core drilling.</p>

Elements	Performance Criteria
1. Follow workplace safety procedures for coring operations.	<p>1.1 Hazards and risks associated with handling, loading, moving, using and storing core drilling equipment are identified.</p> <p>1.2 Workplace procedures are loaded, unloaded, moved, handled and followed for the use and storage of core drilling equipment and all associated tools, sampling devices and connecting equipment.</p> <p>1.3 Racks are set up and stabilized.</p> <p>1.4 Necessary safety precautions are taken when handling potentially contaminated samples.</p> <p>1.5 All necessary personal protective equipment and protective clothing is worn when assisting with core drilling.</p>
2. Support the core drilling process.	<p>2.1 Correct bits/reamers are fitted/ removed and measured to/from the core barrel.</p> <p>2.2 Rod string is laid out in readiness for tripping/ drilling.</p> <p>2.3 Drill rods and core inner tubes are added/ removed.</p> <p>2.4 Inner tube/core barrel is inspected regularly and worn/ damaged components are replaced under the direction of the driller.</p> <p>2.5 Housekeeping and site safety measures are observed while supporting core drilling operations.</p> <p>2.6 Rod/casing handling equipment is used according to manufacturer's recommendations and the organization's procedures.</p> <p>2.7 Diamond tools are stored and handled according to manufacturer/ organization policy.</p> <p>2.8 Overshot retrieval system is operated according to manufacturer/ organization procedures</p>
3. Handle core samples.	<p>3.1 Inner tube is dismantled for recovery of core samples.</p>

	<p>3.2 Core samples are removed from inner tube and placed in core trays in correct sequence for inspection by the clients' representative.</p> <p>3.3 Sections of core retained in the core lifter are removed and placed into the core box in the appropriate place.</p> <p>3.4 Information on core marker blocks and core box are recorded accurately and legibly.</p> <p>3.5 Precautions are taken to ensure no surface contamination of cores and delicate cores are preserved.</p> <p>3.6 Safe stacking procedures are followed for core boxes during storage and transportation.</p> <p>3.7 Collection of sludge samples is carried out as required.</p> <p>3.8 Appropriate lifting techniques are applied when lifting full core boxes.</p> <p>3.9 Inner tube components are cleaned and lubricated as required and re-assembled in preparation for the next run.</p>
4. Mix drilling fluids.	<p>4.1 Appropriate protective clothing is worn.</p> <p>4.2 Labels are checked and safety information/hazard codes are read and interpreted.</p> <p>4.3 Correct mixing procedure is applied for the drilling fluid.</p> <p>4.4 Storage of drilling mud components and additives are carried out safely and according to manufacturer's and organization's recommendations.</p> <p>4.5 Basic tests on the fluid are performed and the results are recorded/ reported as required.</p>
5. Carry out basic maintenance of tools and equipment	<p>5.1 Inspection and checks on serviceability of core barrel components including outer tube, inner tube, split tubes (as required), core lifter case and core lifter, head assembly, and wire line overshot assembly are performed as required.</p> <p>5.2 Inspections and routine checks on ancillary equipment are performed.</p> <p>5.3 Inspections and basic maintenance on rod handling equipment are performed.</p> <p>5.4 Occupational health and safety procedures are observed in carrying out equipment maintenance and correct personal protective equipment is used.</p> <p>5.5 Restraining devices are fitted to Kelly hoses as required.</p>

Variable	Range
Drill rods	including: <ul style="list-style-type: none"> • Wire line drill rod • Casing

	<ul style="list-style-type: none"> • Barrel and inner tube component threads • API and IF threads • 'Q' series threads
Core barrels	<p>including:</p> <ul style="list-style-type: none"> • Double tube wire line core barrels • Triple tube wire line core barrels • Starter barrels • SPT sampling barrels • Chrome barrel
Hazardous situations	<p>May include:</p> <ul style="list-style-type: none"> • Release of gases from formation or samples obtained • Spread of contaminants as a result of drilling or cleaning processes • Change in the chemistry of contaminants as a result of drilling and recovery of the core samples • Working in proximity to drilling rig • Entanglement in rotating rods or casing • Blowout of inner barrel splits • String makeup and breakout hazards • Hazards with the use of grout mixers, pumps
Drill bits	<p>including:</p> <ul style="list-style-type: none"> • Blade bits • Tricone bits • PCD bits • Surface set diamond core bits and reamers • Impregnated diamond core bits and reamers
Fluid circulation system components	<p>include:</p> <ul style="list-style-type: none"> • Water swivels • Kelly hoses • Mud pump • Mixing tanks and settling pits
Measurements	<p>May include:</p> <ul style="list-style-type: none"> • Bit diameters • Core barrel diameters and lengths • Reamer shell diameters • Matching core lifters, core lifter cases and related items
Rod/casing handling equipment	<p>include:</p> <ul style="list-style-type: none"> • Manual handling • Mechanized rod handlers • Hydraulic rod/casing spinners • Hoisting plugs • Hook and clam shell • Foot clamps (hydraulic or manual)
Casing type	<p>Includes:</p> <ul style="list-style-type: none"> • Steel casing • PVC casing
Casing sealants	<p>include:</p> <ul style="list-style-type: none"> • Urethane foam

	<ul style="list-style-type: none"> • Cement • Gypset
Make and Break	<p>Include:</p> <ul style="list-style-type: none"> • Stilsons • Hydraulic tong and pipe wrenches • Break-out wrench • Rod spinner • tube spanner
Sampling	<p>includes:</p> <ul style="list-style-type: none"> • Core samples • Sludge samples from coring and rotary drilling • Keeping core clean • Correct placement of core • Security of core tray stacks
Record keeping documents	<p>may include:</p> <ul style="list-style-type: none"> • Note book • Plastic bags (write on) • Hole logs
Details to be recorded on/in core boxes	<p>May include:</p> <ul style="list-style-type: none"> • Project number • Hole number • Tray number • Depth (per client and company requirements) • Core loss details (i.e. depth interval) • Core breaks (made by hammer during removal from inner tube)
Drilling fluids and additives	<p>may include:</p> <ul style="list-style-type: none"> • Drill mud and additives • Soluble oil • Lost circulation material
Basic drilling fluid tests	<p>may include:</p> <ul style="list-style-type: none"> • Viscosity • Mud weight • Use of marsh funnel and cup
Driller's assistant duties	<p>may include:</p> <ul style="list-style-type: none"> • Carry out pre-start checks • Fuel vehicles, drill rigs and ancillary plant • Lubricate plant and equipment as required • Set up ancillary plant under the direction of the driller • Assist in the make up/break out of drill rods and handling of drill rods when tripping • Service down hole equipment, including core barrel inner tube and barrel as directed • Keep collar of hole clear • Construct and maintain drains, bunds and water collection areas • Collect, split and bag samples • Place core in core tray and mark trays to client specifications

	<ul style="list-style-type: none"> • Drive truck and cart water as required • Keep all equipment clean and stored correctly • Follow good house keeping • Wash vehicles and keep clean inside and out • Travel to town to obtain supplies as required
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Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • Correct placement of core in core tray/boxes • Compliance with safety precautions when handling potentially hazardous/contaminated samples • Recognition of hazardous conditions • Recognition of hazardous samples (e.g. odour, trace colours-indicating metals or salts) • Safety in manual handling, lifting and carrying
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • Reasons for identification and care of samples including storage and transport • Occupational health, safety and environment issues for the level in the non-hydrocarbon drilling industry • Information to be placed on core boxes/core marker blocks • Wire line coring equipment, components and nomenclature • Requirements for collaring of bore holes, including equipment, methods, seals, installation procedures and maintenance of tuffing boxes and/or 'T' pieces • Mud pumps and their applications • Basic knowledge of bit types and their applications to different geological conditions • Basic knowledge of fluid circulation system and its effect on hole integrity and sample quality
Underpinning Skills	<p>Demonstrate skills of:</p> <ul style="list-style-type: none"> • Measurement and identification of core bits, reamer shells and related components • Identification of thread types in use on site • Identification of bits in use and how to measure them • Safe storage of diamond tools • Use of various rod handling equipment on site • Assist in the removal/adding of drill rods to the line string • Refueling operations on vehicles, drill rigs and ancillary equipment • Identification of correct lubricants • Correct handling of samples • Good housekeeping principals • Identification and mixing of drill fluids • Identification of bits to suit differing ground conditions • Basic maintenance of mud and/or water delivery pumps
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and Equipment, and to information on workplace practices and OHS practices.</p>

Methods of Assessment	Competence may be assessed through: <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level II	
Unit Title	Assist Conventional Core Drilling
Unit Code	MIN EDD2 09 0114
Unit Descriptor	<p>This unit covers the technical knowledge and practical skills, specific to assisting with operations using conventional core drilling at the driller's assistant level. It will be complemented by other general units that cover the more generic aspects of supporting drilling operations.</p> <p>Specific sampling competencies are included here.</p> <p>Core drilling may also be called diamond core drilling, diamond drilling or coring.</p> <p>This unit applies primarily to the geotechnical and mineral exploration sectors, and any other sectors using conventional core drilling.</p>

Elements	Performance Criteria
1. Follow workplace safety procedures for coring operations.	<p>1.1 Hazards and risks associated with handling, loading, moving are identified using and storing core drilling equipment.</p> <p>1.2 Workplace procedures are loaded, unloaded, moved, handled and followed for the use and storage of core drilling equipment and all associated tools, sampling devices and connecting equipment.</p> <p>1.3 Racks are set up and stabilized.</p> <p>1.4 Necessary safety precautions are taken when handling potentially contaminated samples.</p> <p>1.5 All necessary personal protective equipment and protective clothing are worn when assisting with core drilling.</p>
2. Support the core drilling process.	<p>2.1 Correct bits/reamers are fitted/ removed and measured to/from the core barrel.</p> <p>2.2 Rod string is laid out in readiness for tripping/drilling.</p> <p>2.3 Drill rods are added/ removed.</p> <p>2.4 Core barrel is inspected regularly and worn/damaged components are replaced under the direction of the driller.</p> <p>2.5 Housekeeping and site safety measures are observed while supporting core drilling operations.</p> <p>2.6 Rod/casing handling equipment is used according to manufacturer's recommendations and the organization's procedures.</p> <p>2.7 Diamond tools are stored and handled according to manufacturer/ organization policy.</p>
3. Handle core samples.	<p>3.1 Pump-out system on core barrel is set up for recovery of core samples if required.</p>

	<p>3.2 Core samples are removed from core barrel and placed in core trays in correct sequence for inspection by the clients' representative.</p> <p>3.3 Core trays and samples are numbered.</p> <p>3.4 Sections of core retained in the core lifter are removed and placed into the core box in the appropriate place.</p> <p>3.5 Information on core marker blocks and core box is recorded accurately and legibly.</p> <p>3.6 Precautions are taken to ensure no surface contamination of cores/delicate cores are preserved.</p> <p>3.7 Safe stacking procedures are followed for core boxes during storage and transportation.</p> <p>3.8 Collection of sludge samples is carried out as required.</p> <p>3.9 Appropriate lifting techniques are applied when lifting full core boxes.</p> <p>3.10 Core barrel components are cleaned and lubricated as required and re-assembled in preparation for the next run.</p>
4. Mix drilling fluids.	<p>4.1 Appropriate protective clothing is worn.</p> <p>4.2 Labels are checked and safety information/ hazard codes are read and interpreted.</p> <p>4.3 Correct mixing procedure is applied for the drilling fluid.</p> <p>4.4 Storage of drilling mud components and additives is carried out safely and according to manufacturer's and organization's recommendations.</p> <p>4.5 Basic tests on the fluid are performed and the results are recorded /reported as required.</p>
5. Carry out basic Maintenance of tools and equipment.	<p>5.1 Inspection and checks on serviceability of core barrel components including outer tube, inner tube, split tubes (as required), core lifter case and core lifter, and back-end assembly are performed.</p> <p>5.2 Inspections and routine checks on ancillary equipment are performed.</p> <p>5.3 Inspections and basic maintenance on rod handling equipment are performed.</p> <p>5.4 Occupational health and safety procedures are observed in carrying out equipment maintenance and correct personal protective equipment is used.</p> <p>5.5 Restraining devices are fitted to Kelly hoses as required.</p>

Variable	Range
Drill rods	including: <ul style="list-style-type: none"> • Conventional drill rod

	<ul style="list-style-type: none"> • Casing • Barrel and inner tube component threads • API and IF threads • 'W' Series threads
Core barrels	<p>including:</p> <ul style="list-style-type: none"> • Conventional single tube core barrels • Conventional double tube core barrels • Conventional triple tube core barrels • Starter barrels • SPT sampling barrels • Chrome barrel
Hazardous situations	<p>May include:</p> <ul style="list-style-type: none"> • Release of gases from formation or samples obtained • Spread of contaminants as a result of drilling or cleaning processes • Change in the chemistry of contaminants as a result of drilling and recovery of the core samples • Working in proximity to drilling rig • Entanglement in rotating rods or casing • String makeup and breakout hazards • Hazards with the use of grout mixers, pumps
Drill bits	<p>including:</p> <ul style="list-style-type: none"> • Blade bits • Tricone bits • PCD bits • Surface set diamond core bits and reamers • Impregnated diamond core bits and reamers
Fluid circulation system components	<p>include:</p> <ul style="list-style-type: none"> • Water swivels • Kelly hoses • Mud pump • Mixing tanks and settling pits
Measurements	<p>include:</p> <ul style="list-style-type: none"> • Bit diameters • Core barrel diameters and lengths • Reamer shell diameters • Matching core lifters, core lifter cases and related items
Rod/casing handling equipment	<p>Include:</p> <ul style="list-style-type: none"> • Manual handling • Mechanized rod handlers • Hydraulic rod/casing spinners • Hoisting plugs • Hook and clam shell • Foot clamps (hydraulic or manual)
Casing type	<p>Include:</p> <ul style="list-style-type: none"> • Steel casing • PVC casing

Casing sealants	include: <ul style="list-style-type: none"> • Urethane foam • Cement • Gypset
Make and Break	May include: <ul style="list-style-type: none"> • Stilsons • Hydraulic tong and pipe wrenches • Break-out wrench • Rod spinner • Tube spanner • Wrap around spanners
Sampling	includes: <ul style="list-style-type: none"> • Core samples • Sludge samples from coring and rotary drilling • Keeping core clean • Correct placement of core • Security of core tray stacks
Record keeping documents	may include: <ul style="list-style-type: none"> • Note book • Plastic bags (write on) • Hole logs
Details to be recorded on/in core boxes	may include: <ul style="list-style-type: none"> • Project number • Hole number • Tray number • Depth (per client and company requirements) • Core loss details (i.e. depth interval) • Core breaks (made by hammer during removal from inner tube)
Drilling fluids and additives	may include: <ul style="list-style-type: none"> • Drill mud and additives • Soluble oil • Lost circulation material
Basic drilling fluid tests	may include: <ul style="list-style-type: none"> • Viscosity • Mud weight • Use of marsh funnel and cup
Driller's assistant duties	may include: <ul style="list-style-type: none"> • Carry out pre-start checks • Fuel vehicles, drill rigs and ancillary plant • Lubricate plant and equipment as required • Set up ancillary plant under the direction of the driller • Assist in the make up/break out of drill rods and handling of drill rods when tripping • Service down hole equipment, including core barrel as directed • Keep collar of hole clear • Construct and maintain drains, bunds and water collection

	<p>areas</p> <ul style="list-style-type: none"> • Collect, split and bag samples • Place core in core tray and mark trays to client specifications • Drive truck and cart water as required • Keep all equipment clean and stored correctly • Follow good house keeping • Wash vehicles and keep clean inside and out • Travel to town to obtain supplies as required
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Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • Correct placement of core in core tray/boxes • Compliance with safety precautions when handling potentially hazardous/contaminated samples • Recognition of hazardous conditions • Recognition of hazardous samples (e.g. odour, trace colours - indicating metals or salts) • Safety in manual handling, lifting and carrying
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • Reasons for identification and care of samples including storage and transport • Occupational health, safety and environment issues for the level in the non-hydrocarbon drilling industry • Information to be placed on core boxes/core marker blocks • Conventional coring equipment, components and nomenclature • Requirements for collaring of bore holes, including equipment, methods, seals, installation procedures and maintenance of stuffing boxes and/or 'T' pieces • Mud pumps and their applications • Basic knowledge of bit types and their applications to different geological conditions • Basic knowledge of fluid circulation system and its effect on hole integrity and sample quality
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • Measurement and identification of core bits, reamer shells and related components • Identification of thread types in use on site • Identification of bits in use and how to measure them • Safe storage of diamond tools • Use of various rod handling equipment on site • Assist in the removal/adding of drill rods to the line string • Refuelling operations on vehicles, drill rigs and ancillary equipment • Identification of correct lubricants • Correct handling of samples • Good housekeeping principals • Identification and mixing of drill fluids

	<ul style="list-style-type: none"> • Identification of bits to suit differing ground conditions • Basic maintenance of mud and/or water delivery pumps
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: <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level II	
Unit Title	Assist with Air Drilling
Unit Code	MIN EDD2 10 0114
Unit Descriptor	<p>This unit covers assisting with air drilling in resources and infrastructure industries. It includes planning and preparing for assisting with air drilling, supporting the air drilling process, collaring holes and inserting casings, handling samples, using restraining devices, mixing drilling fluids for air/foam drilling and carrying out basic maintenance of tools and equipment.</p> <p>Air drilling is used for environmental, geotechnical, mineral exploration, mineral production, blast hole, seismic and water well drilling. This unit is appropriate for those working in driller's assistants roles, at worksites within: Civil construction, Coal mining, Drilling, Extractive industries, and Metalliferous mining.</p>

Elements	Performance Criteria
1. Plan and prepare for assisting with air drilling	<p>1.1 Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2 Work instructions are obtained, confirmed and applied for the allocated task.</p> <p>1.3 All potential hazards are identified, managed and reported.</p> <p>1.4 Coordination requirements are resolved with others at the site prior to commencing and during work activities.</p> <p>1.5 Rotary air drilling equipment and all associated tools, sampling devices and connecting equipment are loaded, unloaded, moved, handled, used and stored.</p> <p>1.6 Appropriate personal protective equipment and protective clothing are selected and used.</p>
2. Support the air drilling process	<p>2.1 Correct bits and down-hole tools are fitted and removed and measured to/from the drill string.</p> <p>2.2 Drill string is prepared in readiness for tripping and drilling.</p> <p>2.3 Drill bits are sharpened in accordance with specifications.</p> <p>2.4 Drill rod is added and removed to and from the drill string.</p> <p>2.5 Drill pipe, bits, threads and other down-hole equipment are inspected and maintained.</p> <p>2.6 Pipe and casing handling equipment is used.</p> <p>2.7 Casing is installed and sealed using the correct methods as per company policies/procedures.</p> <p>2.8 Stuffing boxes and collar T pieces are used, installed and maintained as per manufacturer's requirements.</p>
3. Handle samples	<p>3.1 Samples are obtained and/or laid out as required.</p>

	<p>3.2 Samples are torn, bagged, labeled and stored for transport according to workplace or site specific requirements.</p> <p>3.3 Sampling equipment is cleaned and serviced as required.</p> <p>3.4 Uncontaminated samples are obtained using appropriate sampling methods.</p> <p>3.5 Necessary safety precautions are taken when handling potentially hazardous samples.</p> <p>3.6 Blockages in sample and delivery system are safely cleared.</p> <p>3.7 Possible changes are noted and reported to sample quality due to blockages.</p>
4. Use restraining devices	<p>4.1 Restraining devices are fitted.</p> <p>4.2 Dangers of high velocity samples are identified in air drilling and appropriate measures taken to minimize hazard.</p>
5. Mix drilling fluids for air/foam drilling	<p>5.1 Appropriate protective clothing is worn.</p> <p>5.2 Labels are checked and safety information/ hazard codes read and interpreted.</p> <p>5.3 The drilling fluid is mixed as required.</p> <p>5.4 Drilling fluid components and additives are stored safely and according to requirements.</p>
6. Carry out basic maintenance of tools and equipment	<p>6.1 Inspections and routine checks on ancillary equipment such as air compressor and injection pump are performed.</p> <p>6.2 Inspections and basic maintenance of pipe handling equipment are performed.</p> <p>6.3 OHS procedures are observed in carrying out equipment maintenance.</p> <p>6.4 Bit sharpening equipment is selected and maintained in accordance with site specifications.</p>

Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organisational and site requirements and procedures • manufacturer's guidelines and specifications • Relevant Ethiopian standards • code of practice • Employment and Workplace Relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Hazards	<p>may include:</p> <ul style="list-style-type: none"> • release of gases from formation or samples obtained • spread of contaminants as a result of drilling or cleaning processes • change in the chemistry of contaminants as a result of

	<p>drilling and recovery of the samples</p> <ul style="list-style-type: none"> • working in proximity to drilling rig • use of high pressure air for drilling operations • entanglement in rotating pipes • string makeup and breakout hazards • drilling equipment and down-hole tools will depend on the air drilling method being used
Coordination requirements	<p>may include:</p> <ul style="list-style-type: none"> • other equipment operators • maintenance personnel • supervisors • mine personnel
Personal protective equipment	<p>includes:</p> <ul style="list-style-type: none"> • steel-capped boots and hardhat • gloves • dust mask • eye and hearing protection • general protective and reflective clothing
Bits	<p>may include:</p> <ul style="list-style-type: none"> • tri-cone bits • blade bits • tungsten carbide 'core' bits • DTH hammer bits RC and conventional • PCD bits
Rod and pipe	<p>may include:</p> <ul style="list-style-type: none"> • air core rods • casing • conventional drill pipe • dual wall reverse circulation drill pipe • API and IF threads
Pipe and casing handling equipment	<p>may include:</p> <ul style="list-style-type: none"> • rod clamps (hydraulic or manual) • manual handling • hoisting plugs • C spanner • hook and clam shell pipe or rod sling • hydraulic pipe/rod/casing spinner • mechanized rod handler • slips • slips basket
Samples	<p>may include:</p> <ul style="list-style-type: none"> • chip samples (RAB, Air core, DTH hammer, RC samples) • 'core' samples from air core drilling
Sampling equipment	<p>may include:</p> <ul style="list-style-type: none"> • cyclones • sample splitters • wet samplers • rotary samplers

Restraining devices	<p>may include:</p> <ul style="list-style-type: none"> • internal cable whip checks • double eyelet sock type whip checks • full sock whip checks
Dangers of high velocity samples	<p>may be caused by:</p> <ul style="list-style-type: none"> • high wear rates on components • sample hose blockages • sample hose rupture
Drilling fluids and additives	<p>may include:</p> <ul style="list-style-type: none"> • air • foam • polymers • water

Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence of:</p> <ul style="list-style-type: none"> • the requirements, procedures and instructions for assisting with air drilling • implementation of requirements, procedures and techniques for the safe, effective and efficient assisting with air drilling • working with others to undertake and complete the air drilling tasks that meets all of the required outcomes • consistent timely completion of assisting with air drilling tasks that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • reasons for identification and care of samples including storage and transport • OHS and environment requirements and procedures • use of Material Safety Data Sheets (MSDS) • basic operation of compressors and the need for cleanliness when carrying out compressor maintenance • critical need to match threads with threads on tubular components • drilling operational requirements and procedures • theory behind sharpening bits • monitoring of sample quality to restrict contamination • importance of correct measurement of bits and other related components • methods for clearing blockages in air or rotary holes • methods of clearing blocked sample and delivery hoses • requirement of restraining devices on all high pressure and delivery hoses • potential hazards with the operation of rod handling devices
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures • operate ancillary equipment such as air compressors, boosters and cyclones (equipment is to some extent

	<p>dependent on the type of air drilling being carried out)</p> <ul style="list-style-type: none"> • apply basic maintenance and servicing of compressors and auxiliary equipment • measure and identify hammer bits, shrouds and related components • identify thread types in use on site • identify bits in use and how to measure them • use various rod handling equipment on site • assist with the removal/adding of drill rods to the line string • apply refuelling procedures for vehicles, drill rigs and ancillary equipment • identify correct lubricants • apply correct handling of samples • apply good housekeeping principles • disassemble, inspect and reassemble DTH hammers • install restraining devices to pressure and delivery hoses • inspect and replace inner tubes in RC pipe • inspect and replace sealing devices in RC pipe • install T piece to collar casing • identify and mix of drill additives • identification of bits • apply basic maintenance of water delivery pumps • apply vehicles cleaning procedures • drive vehicles
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: <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level II	
Unit Title	Assist Cable Tool Drilling
Unit Code	MIN EDD2 11 0114
Unit Descriptor	<p>This unit covers assisting with cable tool drilling in the drilling industry. It includes planning and preparing for assisting with cable tool drilling, supporting the core drilling process, handling samples, and mixing drilling fluids.</p> <p>This unit is appropriate for those working in an assistant role at worksites within drilling industry.</p>

Elements	Performance Criteria
1. Plan and prepare for cable tool drilling	<p>1.1 Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2 Work instructions are obtained, confirmed and applied for the allocated task.</p> <p>1.3 All potential hazards are identified, managed and reported.</p> <p>1.4 Coordination requirements are resolved with others at the site prior to commencing and during work activities.</p> <p>1.5 Workplace procedures are loaded, unloaded, moved, handled and followed for the use and storage of drilling equipment and all associated tools, sampling devices and connecting equipment.</p> <p>1.6 Necessary safety precautions are taken when handling potentially contaminated samples.</p> <p>1.7 All necessary personal protective equipment and protective clothing are worn when assisting with cable tool drilling.</p>
2. Support the core drilling process	<p>2.1. Correct bits are fitted/removed and measured to/from the tool string.</p> <p>2.2. Tools and equipment are laid out in readiness for drilling.</p> <p>2.3. Tool string components are inspected regularly and worn/damaged components replaced under the direction of the driller.</p> <p>2.4. Housekeeping and site safety measures are observed while supporting cable tool drilling operations.</p> <p>2.5. Rod/casing handling equipment is used according to manufacturer's recommendations and the organization's procedures.</p>
3. Handle samples	<p>3.1. Samples are removed from barrels as required.</p> <p>3.2. Precautions are taken to ensure no surface contamination of samples.</p> <p>3.3. Collection of sludge samples is carried out as required.</p>

4. Mix drilling fluids	<p>4.1. Appropriate protective clothing is worn.</p> <p>4.2. Labels are checked and safety information/ hazard codes read and interpreted.</p> <p>4.3. Correct mixing procedure is applied for the drilling fluid.</p> <p>4.4. Storage of drilling mud components and additives is carried out safely and according to manufacturer's and organization's recommendations.</p> <p>4.5. Basic tests on the fluid are performed and the results recorded/reported as required.</p>
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Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organisational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Work instructions	<p>may come from briefings, handovers, plans and work orders and may be written or verbal, formal or informal and may include:</p> <ul style="list-style-type: none"> • carrying out pre-start checks • fuelling vehicles, drill rigs and ancillary plant • lubricating plant and equipment as required • setting up ancillary plant under the direction of the driller • assisting in the make up/break out of tools • servicing down hole tools, including dressing bits • keeping collar of hole clear • constructing and maintaining drains, bunds and water collection areas • collecting and bag samples • driving truck and cart water as required • keeping all equipment clean and stored correctly • following good house keeping • washing vehicles and keeping them clean inside and out • travelling to town to obtain supplies as required
Hazards	<p>may include:</p> <ul style="list-style-type: none"> • working in proximity to drilling rig • release of gases from formation or samples obtained • spread of contaminants as a result of drilling or cleaning processes • change in the chemistry of contaminants as a result of drilling and recovery of the core samples • working in proximity to drilling rig • entanglement in drill or bailing lines • string makeup and breakout hazards

	<ul style="list-style-type: none"> • hazards with the use of grout mixers, pumps 		
Coordination requirements	<p>may include:</p> <ul style="list-style-type: none"> • other equipment operators • maintenance personnel • supervisors • site personnel 		
Measure	<p>may include:</p> <ul style="list-style-type: none"> • bit diameters • clay/sand barrel diameters and lengths 		
Tools and equipment	<p>may include:</p> <ul style="list-style-type: none"> • AWW casing • slimline casing • API tool threads • goldfields tool threads • southern cross tool threads • appropriate bits, shoes, clamps, casing, tools and lifting devices including: <ul style="list-style-type: none"> ➤ spudding bits ➤ undercutting bits ➤ star bits ➤ chisel bits ➤ jars ➤ drive clamps ➤ casing lift/drive caps • make and break equipment including: <ul style="list-style-type: none"> ➤ stilsons ➤ hydraulic tong and pipe wrenches ➤ break-out wrench 		
Casing type	<p>may include:</p> <ul style="list-style-type: none"> • steel casing • PVC casing • Casing sealants may include: <ul style="list-style-type: none"> ➤ urethane foam ➤ cement ➤ gypset 		
Handling equipment	<p>may include:</p> <ul style="list-style-type: none"> • tool spanners • tool wrenches • slings • chain tongs • casing clamps • casing jacks 		
Samples	<p>may include:</p> <ul style="list-style-type: none"> • samples from sand/clay barrels • sludge samples from the bailer 		
Drilling fluids	<p>may include:</p> <ul style="list-style-type: none"> • water • bentonite 		
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	<ul style="list-style-type: none"> • polymer • barite • lost circulation material
Tests on the fluid	<p>may include:</p> <ul style="list-style-type: none"> • viscosity • mud weight • use of marsh funnel and cup
Record/report documents	<p>may include:</p> <ul style="list-style-type: none"> • note book • plastic bags (write on) • hole logs

Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence of:</p> <ul style="list-style-type: none"> • the requirements, procedures and instructions for assisting with cable tool drilling • implementation of requirements, procedures and techniques for the safe, effective and efficient assisting with cable tool drilling • working with others to assist with cable tool drilling that meets all of the required outcomes • consistent timely assistance with cable tool drilling that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • reasons for identification and care of samples including storage and transport • occupational health, safety and environment issues in the non-hydrocarbon drilling industry • cable tool drilling equipment, components and nomenclature • basic knowledge of bit types and their applications to different geological conditions
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures for assisting with cable tool drilling • identification of thread types in use on site • identification of bits in use and how to measure them • use of various rod handling equipment on site • refuelling operations on vehicles, drill rigs and ancillary equipment • identification of correct lubricants • correct handling of samples • good housekeeping principals • identification and mixing of drill fluids • identification of bits to suit differing ground conditions
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and Equipment, and to information on workplace practices and OHS practices.</p>

Methods of Assessment	Competence may be assessed through: <ul style="list-style-type: none">• 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: Mineral Exploration and Development Drilling Level II	
Unit Title	Assist Top/Down Whole Hammer Drilling
Unit Code	MIN EDD2 12 0114
Unit Descriptor	This unit covers the technical knowledge and skills which are specific to top/down whole hammer drilling. It will be complemented by other general units which cover the more generic aspects of drilling.

Elements	Performance Criteria
1. Identify and respond to workplace hazards and risks	<p>1.1 Restraining devices on all pressure hoses are checked.</p> <p>1.2 Restraining devices on pressure hoses are fitted/ replaced as required.</p> <p>1.3 Other workplace hazards and risks are identified.</p> <p>1.4 The nature, location and scope of hazard and/or risk are assessed.</p> <p>1.5 Site procedures are followed for managing hazards and risks.</p> <p>1.6 Relevant hazard/hazard control information is communicated to crew and supervisor.</p> <p>1.7 Alarm/report is raised as required according to site procedures.</p>
2. Follow workplace safety procedures for top/down whole hammer drilling operations.	<p>2.1 Hazards and risks associated with handling, loading, moving, using and storing drilling equipment are identified.</p> <p>2.2 Top/down hole hammer drilling equipment and all associated tools, sampling devices and connecting equipment are loaded, unloaded, moved, handled, used and stored according to workplace procedures.</p> <p>2.3 Rod racks are set up and stabilized as required.</p> <p>2.4 Necessary safety precautions are taken when handling potentially contaminated samples.</p> <p>2.5 All necessary personal protective equipment and protective clothing are worn when assisting with top/down hole hammer drilling.</p>
3. Assist top/down whole hammer drilling.	<p>3.1 Appropriate rod type, thread form and drill string components are selected for job.</p> <p>3.2 Correct bits/top/down-hole tools are fitted/removed and measured to/from the drill string.</p> <p>3.3 Rod handling equipment is used safely and correctly.</p> <p>3.4 Add/break out is assisted and drill rods and top/down hole hammer equipment are removed.</p> <p>3.5 Add/remove drill rod is assisted to/from the drill string</p> <p>3.6 Line string is measured and depth of hole is calculated.</p>

	<p>3.7 Tungsten carbide button bits are sharpened as required and according to the organization's procedures and/or manufacturer's specifications.</p> <p>3.8 Housekeeping and site safety measures are observed while supporting top/down hole hammer drilling operations.</p>
4. Handle samples.	<p>4.1 Samples are obtained in accordance with workplace, drilling sector or site procedures.</p> <p>4.2 Samples are torn, bagged, labeled and stored for transport according to workplace or site specific requirements.</p> <p>4.3 Sampling equipment is cleaned and serviced as required.</p> <p>4.4 Appropriate sampling methods are used to limit the contamination of samples to an acceptable level.</p> <p>4.5 Blockages in sample and delivery hose to organization procedures are cleared.</p> <p>4.6 Possible changes to sample quality due to blockages are noted and reported.</p>
5. Assist to mix drilling fluids for air/foam drilling.	<p>5.1 Appropriate protective clothing is worn.</p> <p>5.2 Labels are checked and safety information/ hazard codes read and interpreted.</p> <p>5.3 The drilling fluid is mixed according to procedure.</p> <p>5.4 Drilling fluid components and additives are stored safely and according to manufacturer's recommendations.</p>
6. Carry out basic maintenance of tools and equipment.	<p>6.1 Inspections and routine checks on ancillary equipment are performed.</p> <p>6.2 Occupational health and safety procedures are observed in carrying out equipment maintenance.</p>

Variable	Range
Restraining devices	<p>May include:</p> <ul style="list-style-type: none"> • Internal/external whip checks • Full 'sock' whip checks • Anchor points • Hose fittings
Typical hazards	<p>include:</p> <ul style="list-style-type: none"> • Injuries to fingers, hands and back • Working in proximity to drilling rig • Inadequate maintenance • Heat, dust, fatigue, dehydration • High pressure air discharge • High pressure hydraulic fluid discharge • Leakage of couplings • Flailing couplings • Flailing components

Typical tools and equipment	<p>include:</p> <ul style="list-style-type: none"> • Drill rods including- • shanks • thread types • couplings • Drill bits including- • DTH hammer concave, convex and flat face bits • Rod and casing handling equipment- • manual handling • mechanized rod handlers • hydraulic rod/clamps • hydraulic rod/spinner • Rod handling- • hydraulic wrenches • rod spinners • hydraulic make/break devices
Typical samples/ sampling tasks	<p>may include:</p> <ul style="list-style-type: none"> • DTH samples
Typical fluids	<p>may include:</p> <ul style="list-style-type: none"> • Dust control additives • water
Typical maintenance tasks	<p>may include:</p> <ul style="list-style-type: none"> • Sharpening button bits, cross bits • Using grinders, bit sharpening machines • Line string components (e.g. drill rods, subs, stabilisers, couplings, air swivels) • Drill bits
Typical driller's assistant duties	<p>may include:</p> <ul style="list-style-type: none"> • Carry out pre-start checks • Fuel vehicles, drill rigs and ancillary plant • Calculate line string and hole depth • Monitor collection and bagging of samples as required • Ensure all equipment is kept clean and stored correctly • Ensure principles of good housekeeping are followed

Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence of:</p> <ul style="list-style-type: none"> • Safe and efficient operation • Meeting quality and productivity targets • Adherence to relevant federal legislative requirements • Adherence to environment, heritage and discrimination Requirements
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • Methods required to limit the contamination of samples as required • Theory behind TC bit sharpening • Why it is important to monitor sample quantity when required • Role that blockages play in affecting sample quality

	<ul style="list-style-type: none"> • Critical need for restraining devices to be fitted to all pressure delivery hoses and sample delivery hoses, the devices available and their methods of attachment
Underpinning Skills	<p>Demonstrate skills of:</p> <ul style="list-style-type: none"> • Identification of worn drill rods and damaged threads • Correctly using the various rod handling equipment on site • Correctly and competently adding/removing rods from the string • Correctly measuring line string components and calculating hole depth • Ensuring that samples are correctly collected and handled where required • Correctly measuring bits and related components to ensure compatibility • Ensuring that bit sharpening equipment, used to sharpen TC bits is used correctly and safely and that bits are sharpened to correct tolerances • Monitoring sample quality and correctly interpreting changes • Using prescribe techniques to safely clear sample delivery hose blockages • Installation and maintenance of restraining devices to pressure and sample delivery hoses • Communicating to all work crew members, the hazards of dust from cuttings in the air stream • Ensuring that drill rods are inspected regularly for wear • Ensuring that rod threads and couplings are inspected and maintained as required
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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level II	
Unit Title	Assist Continuous Flight Auger Drilling
Unit Code	MIN EDD2 13 0114
Unit Descriptor	<p>This unit covers the assisting with continuous flight auger drilling in resources and infrastructure industries. It includes planning and preparing for assisting with continuous flight auger drilling, assisting with augering process, obtaining samples, cleaning equipment, carrying out water sampling, and carry out basic maintenance of tools and equipment.</p> <p>Flight auger drilling is used in environmental, foundation, geotechnical, minerals exploration, seismic and water well drilling.</p> <p>This unit is appropriate for those working in drillers assistant roles, at worksites within: Civil construction, Coal mining, Drilling, Extractive industries, and Metalliferous mining.</p>

Elements	Performance Criteria
1. Plan and prepare for assisting with continuous flight auger drilling	<p>1.1 Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2 Work instructions are obtained, confirmed and applied for the allocated task.</p> <p>1.3 All potential hazards are identified, managed and reported.</p> <p>1.4 Coordination requirements are resolved with others at the site prior to commencing and during work activities.</p> <p>1.5 Continuous flight augers and all associated tools, sampling devices and connecting equipment are loaded, unloaded, moved, handled, used and stored.</p> <p>1.6 Auger racks are set up and stabilized.</p> <p>1.7 Appropriate personal protective equipment and protective clothing are selected and used.</p>
2. Assist with augering process	<p>2.1 Bits are fitted and removed to and from the lead auger.</p> <p>2.2 Auger string in readiness is laid out for auger process.</p> <p>2.3 Augers insert are removed from the drill string and assisted with auger to auger connections.</p> <p>2.4 Cleanliness around the whole collar is regularly maintained by removing spoil only when rotation is stopped.</p> <p>2.5 Housekeeping and site safety measures are observed while conducting auger assistance and sampling duties.</p>
3. Obtain samples	<p>3.1 Disturbed samples are obtained and/or laid out from flights as required.</p> <p>3.2 Necessary safety precautions are taken when handling potentially contaminated samples.</p>

	<p>3.3 Undisturbed samples are bagged, properly labeled and stored for transport in accordance with requirements.</p> <p>3.4 Soil samples are obtained from SPT split spoon, undisturbed sample tube, direct push, coring bit or other down hole mechanical device used in sampling if required.</p> <p>3.5 SPT samples and label packages are packaged and the test result is included if required.</p> <p>3.6 Undisturbed tubes are cleaned and serviced, loose spoil is removed, mechanical or wax seals are fitted, undisturbed samples are packaged, labeled and stored for transport if required.</p> <p>3.7 Samples obtained from hollow auger sampling devices are removed and packaged or push applications directed when required.</p>
4. Clean equipment	<p>4.1 Sampling devices and associated equipment are cleaned and reassembled.</p> <p>4.2 High pressure cleaners and/or steam cleaning equipment are used to clean augers and equipment.</p> <p>4.3 The spread of contamination is avoided or confined from auger and equipment cleaning processes.</p> <p>4.4 Safe work practices are followed for use of cleaning equipment, chemicals and materials.</p> <p>4.5 Excess spoil is bagged, removed and disposed of or neutralized from site operations.</p>
5. Carry out water sampling	<p>5.1 Holes are bailed or pumped in preparation for collection of water sample.</p> <p>5.2 Water sample bottles are prepared, obtained and handled.</p> <p>5.3 A water sample is obtained from a bore hole.</p> <p>5.4 Correct volume water samples relevant for the analytical purpose or tests required are filled, sealed, labeled, stored and transported using appropriate type containers.</p> <p>5.5 Excess water generated by sampling or cleaning processes that may be contaminated or harmful to the environment, plants, native animals, domestic stock or people are removed or disposed of or neutralized.</p>
6. Carry out basic maintenance of tools and equipment	<p>6.1 Inspection and checks on serviceability of augers including condition of flights, threads, socket connectors, D clips and bits are performed.</p> <p>6.2 Serviceability of pressure cleaning equipment, water sampling pumps, sample tubes, SPT equipment is inspected.</p> <p>6.3 All auger and sampling equipment are maintained in serviceable condition.</p>

	6.4 Occupational health and safety procedures are observed in carrying out equipment maintenance.
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Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Work instructions	<p>may come from:</p> <ul style="list-style-type: none"> • briefings, handovers, plans and work orders and may be written or verbal, formal or informal and may include: <ul style="list-style-type: none"> ➤ nature and scope of tasks ➤ specifications ➤ quality of finished works ➤ achievement targets ➤ operational conditions ➤ obtaining of 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 ➤ contamination control requirements ➤ environmental control requirements ➤ barricade and signage requirements
Hazards	<p>may include:</p> <ul style="list-style-type: none"> • release of gases from formation or samples obtained • exposure to contaminated soil or samples that may be toxic, poisonous, or harmful either through contact with skin or eyes, inhalation of Vapors, or ingestion • spread of contaminants as a result of drilling or cleaning processes • change in the chemistry of contaminants as a result of drilling, sampling or bottling • working in proximity to drilling rig • entanglement in flights • string makeup and breakout hazards • hazards with the use of high pressure/steam cleaners, grout mixers, pumps
Coordination requirements	<p>may include:</p> <ul style="list-style-type: none"> • other equipment operators • maintenance personnel

	<ul style="list-style-type: none"> • supervisors • mine personnel
Personal protective equipment	<p>includes:</p> <ul style="list-style-type: none"> • steel-capped boots and hardhat • gloves • dust mask • eye and hearing protection • general protective and reflective clothing
Sample types	<p>may include:</p> <ul style="list-style-type: none"> • grab samples • flight samples • hand auger samples • SPT samples • push tube samples • water samples • drive core samples taken through hollow stem augers
Cleaning	<p>is to include decontamination of:</p> <ul style="list-style-type: none"> • sampling devices • tools • implements • hosing
Label requirements	<p>may include:</p> <ul style="list-style-type: none"> • project number • bore number • depth interval • test result (e.g. SPT result) • date sampled • time sampled and soil description

Evidence Guide

Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • the requirements, procedures and instructions for assisting with continuous flight auger drilling • implementation of requirements, procedures and techniques for the safe, effective and efficient assisting with continuous flight auger drilling • working with others to undertake and complete the continuous flight auger drilling tasks that meets all of the required outcomes • consistent timely completion of assisting with continuous flight auger drilling tasks that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • occupational health, safety and environment issues • reasons for identification and care of samples including storage and transport • safety measures required when sampling contaminated sites and landfills • components of the chain of custody, including use of seals,

	<p>field log book, chain of custody record, sample labels and sample request forms</p> <ul style="list-style-type: none"> • requirements and procedures for decontamination of sampling equipment, sample containers, pumps • requirements for the preparation for sampling of contaminated site • sampling methods using SPTs, thin walled samplers, continuous sampling system method, hand augers, trowels • basic soil description methods • groundwater sampling protocols and types of sampling tools • requirements and procedures for sampling procedure for volatile organic compound vials • requirements and procedures for acid base sample preservation of groundwater samples • procedures for field measurement of temperature, pH, specific conductance • procedures for test bore and well abandonment • grouting procedures • calculation of volume in cylinders, tanks
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures • operate ancillary equipment such as air compressors, boosters and cyclones (equipment is to some extent dependent on the type of air drilling being carried out) • apply basic maintenance and servicing of compressors and auxiliary equipment • measure and identify flight auger components • identify thread types in use on site • identify bits in use and how to measure them • apply safe storage of tools • use various load handling equipment on site • assist the driller in the removal and adding of drill rods to the line string • apply refuelling procedures for vehicles, drill rigs and ancillary equipment • identify correct lubricants • apply correct handling of samples • apply good housekeeping principals • install restraining devices to pressure and delivery hoses • identification of bits to suit differing ground conditions
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and Equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competency may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Mineral Exploration and Development Drilling Level II	
Unit Title	Support Blow out Prevention Operations
Unit Code	MIN EDD2 14 0114
Unit Descriptor	<p>This unit specifies the competency required to support blow out prevention operations. It includes the minimum criteria for competency assessment of supporting blow out prevention operations.</p> <p>The unit covers assisting with blow out prevention operations (BOP) operations and monitoring and reporting safety issues.</p>

Elements	Performance Criteria
1. Assist with well BOP operations	<p>1.1 Well kill activities are assisted.</p> <p>1.2 BOP equipment status is monitored and reported.</p> <p>1.3 BOP system accumulator is isolated.</p> <p>1.4 Chokes and manifolds are monitored and adjusted as directed.</p> <p>1.5 Emergency shutdown procedures are assisted.</p> <p>1.6 Participate in emergency drills and exercises.</p> <p>1.7 Operational activities and information are communicated to other crew during BOP operations.</p>
2. Monitor and report safety issues	<p>2.1 Hazards associated with blow out prevention are identified, addressed and reported.</p> <p>2.2 Kick indicators are recognized and driller advised during operations.</p> <p>2.3 Ignition sources are identified and reported.</p> <p>2.4 Sources and presence of flammable gases and emissions are identified and reported.</p> <p>2.5 BOP malfunctions are identified and reported.</p>

Variable	Range
Well kill methods	<p>May include:</p> <ul style="list-style-type: none"> • bringing pump up to kill speed • maintaining constant bottom hole pressure • shutting down the kill operation while maintaining a constant bottom hole pressure • controlling the influx using the Driller's Method
Drills and exercises	<p>May include:</p> <ul style="list-style-type: none"> • pit drill • trip drill • abandonment drill • evacuation

Communications	<p>May include:</p> <ul style="list-style-type: none"> • two-way radio • hand signals • telephone • public address system • written work instructions
Hazards	<p>may include:</p> <ul style="list-style-type: none"> • blow out gas to surface • ignition of gas • toxic gases • pressurized coal seam gas system
Kick indicators	<p>May include:</p> <ul style="list-style-type: none"> • flow from wells (pump off) • increase in flow from well (pumps on) • pit volume gain
Ignition sources	<p>May include:</p> <ul style="list-style-type: none"> • Non-explosion protected devices such as: <ul style="list-style-type: none"> ➢ electrical connections/leads ➢ rig lights and wiring ➢ flashlights ➢ computers ➢ mobile phones ➢ electronic car keys ➢ charging circuits from solar panels ➢ charging and starting circuits from vehicles ➢ drill rigs ➢ mud pumps ➢ lighting plants ➢ auxiliary equipment ➢ static discharge - lightning ➢ flare stacks ➢ engine exhausts from vehicles, drill rigs, auxiliary equipment
Flammable gases and emissions	<p>may include:</p> <ul style="list-style-type: none"> • Methane (CH₄) • Hydrogen Sulphide (H₂S) • Carbon Dioxide (CO₂) • Carbon Monoxide (CO)

Evidence Guide

Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • compliance with legislative and regulatory requirements • monitoring BOP equipment status • monitoring BOP control system status • adjusting chokes and returns • recognizing and responding to kick warning signs and indicators • assisting with kill activities • assisting with emergency shutdowns
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	<ul style="list-style-type: none"> • communicating with well control crew members • identifying and reporting ignition sources • identifying and reporting flammable gases and emissions
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • the principles and practices of coal seam gas control • coal seam gas control procedures • risks and their controls related to coal seam gas control • BOP annular equipment operating principles • BOP control system principles • operating principles of chokes and manifolds • kill principles and methods • sources of ignition and their dangers and controls • sources of flammable gases and emissions and their dangers and controls • kick detection warnings and indications and the responses to them • purpose, type and conduct of coal seam gas control emergency drills and exercises • communication methods and protocols during well BOP operations
Underpinning Skills	<p>Demonstrate skills of:</p> <ul style="list-style-type: none"> • working in a team • detecting kick warning signs and indicators • interpreting work instructions and procedures • recording and reporting process status
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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level II	
Unit Title	Assist Underground in-Seam Directional Drilling
Unit Code	MIN EDD2 15 0114
Unit Descriptor	This unit covers assisting with underground in-seam directional drilling in underground coal mines. It includes planning and preparing for assisting with drilling, supporting the drilling process and carrying out basic maintenance of tools and equipment. Underground in-seam directional drilling is conducted for gas extraction and water drainage, barrier proving and exploration in underground coal mining operations. This unit is appropriate for those working in drillers assistant roles, at worksites within: Coal mining and Drilling.

Elements	Performance Criteria
1. Plan and prepare for assisting with drilling	<p>1.1. Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2. All potential hazards are identified, managed and reported.</p> <p>1.3. Work instructions are obtained, confirmed and applied for the allocated task.</p> <p>1.4. Coordination requirements are resolved with others at the site prior to commencing and during work activities.</p> <p>1.5. Directional drilling equipment and all associated tools and connecting are loaded, unloaded, moved and handled.</p>
2. Support the drilling process	<p>2.1. Drill rods are positioned and numbered in readiness for drilling.</p> <p>2.2. In-hole drilling components are inspected for damage.</p> <p>2.3. In-hole drilling components are fitted and removed to and from the drill string as instructed.</p> <p>2.4. Housekeeping is applied.</p> <p>2.5. Communication is maintained with all relevant personnel.</p> <p>2.6. Unplanned gas and water leakage and other environmental hazards are identified.</p>
3. Carry out basic maintenance of tools and equipment	<p>3.1. The drill rods are monitored to wear, damage, dress and grease threads.</p> <p>3.2. Rods in stack are rotated.</p> <p>3.3. All drill equipment and hoses and ancillary equipment are monitored and remedial action is carried out.</p> <p>3.4. Environmental controls are applied.</p> <p>3.5. Ensure that drill fluids are appropriately contained and disposed of appropriately.</p>

Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> legislative, organisational and site requirements and procedures
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	<ul style="list-style-type: none"> • manufacturer's guidelines and specifications • Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Hazards	<p>may include:</p> <ul style="list-style-type: none"> • handling, loading, moving, using and storing underground directional drilling equipment • working in proximity to drilling rig • inadequate communication with drill crew • entanglement in rotating equipment • inhalation or ignition of noxious or flammable gases • vehicles • mining equipment • roof and rib spalls • the presence of gases and water
Work instructions	<p>may come from:</p> <ul style="list-style-type: none"> • briefings, handovers, plans and work orders and may be written or verbal, formal or informal and may include: <ul style="list-style-type: none"> ➢ nature and scope of tasks ➢ specifications ➢ quality of finished works ➢ achievement targets ➢ operational conditions ➢ obtaining of 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 ➢ contamination control requirements ➢ environmental control requirements ➢ barricade and signage requirements
Coordination requirements	<p>may include:</p> <ul style="list-style-type: none"> • other equipment operators • maintenance personnel • supervisors • mine personnel
In hole drilling components	<p>may include:</p> <ul style="list-style-type: none"> • drill rods • drill bits • reamers • survey tools and down-hole motors
Relevant personnel	<p>may include:</p> <ul style="list-style-type: none"> • drill crew members • mine staff and supervisors

	<ul style="list-style-type: none"> • site safety personnel and statutory persons
Ancillary equipment	<p>may include:</p> <ul style="list-style-type: none"> • pumps • water disposal lines and • ventilation equipment
Remedial action	<p>may include:</p> <ul style="list-style-type: none"> • clear or remove obstructions • replace damaged hoses • top-up lubricants

Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • the requirements, procedures and instructions for assisting with underground in-seam directional drilling • implementation of requirements, procedures and techniques for the safe, effective and efficient assisting with underground in-seam directional drilling • working with others to undertake and complete underground in-seam directional drilling that meets all of the required outcomes • consistent timely assisting with underground in-seam directional drilling that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • legislative, organisation's and site OHS requirements • potential underground drilling, underground work environment hazards and underground environmental hazards • organisation's and manufacturer's operational requirements and procedures • equipment handling requirements • housekeeping requirements and procedures
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation, site and manufacturer's requirements and procedures • apply safe manual handling practices • operate ancillary equipment including: <ul style="list-style-type: none"> ➤ pumps ➤ ventilation equipment and ➤ personal protective equipment • apply communication procedures • apply inspection and monitoring procedures • apply maintenance procedures
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and Equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competency may be assessed in the work place or in a simulated work place setting</p>

Occupational Standard: Mineral Exploration and Development Drilling Level II	
Unit Title	Set up and Prepare for Ground Support
Unit Code	MIN EDD2 16 0114
Unit Descriptor	This unit applies in all contexts to the setup and preparation for both development and production drilling for underground extraction.

Elements	Performance Criteria
1. Organize for ground support provision	<p>1.1 Work is conducted according to site procedures, regulations, OHS, other relevant legislation, manufacturer's specifications safely and efficiently.</p> <p>1.2 Shift change is received, interpreted and clarified over details.</p> <p>1.3 Appropriate personal protective equipment is used.</p> <p>1.4 Site conditions are inspected and assessed to determine scaling requirements, misfires and starting point.</p> <p>1.5 Equipment pre-start (visual) checks are conducted to ensure equipment is ready for operation.</p> <p>1.6 Delivery of ground support materials to site is arranged.</p> <p>1.7 Potential risks and hazards are identified, managed and reported according to work plan.</p> <p>1.8 Appropriateness of ground control mechanism is inspected and assessed to ensure safety of site.</p> <p>1.9 Site conditions are assessed and historical information of past performance is reviewed to clarify drilling requirements.</p> <p>1.10 Approved dust suppressant and extraction method is used.</p>
2. Set up and prepare for installation	<p>2.1 Loose material is scaled and site safe made (where applicable).</p> <p>2.2 Drill equipment ensuring safety of operating personnel is positioned and stabilized.</p> <p>2.3 Auxiliary services are connected where required.</p> <p>2.4 Equipment is aligned to access drill pattern according to site conditions.</p> <p>2.5 Holes are drilled according to ground support design and work plan.</p> <p>2.6 Boundaries are erected to prevent unauthorized access.</p> <p>2.7 All required documentations are completed clearly, concisely and on time.</p> <p>2.8 End of shift information is passed to oncoming shift.</p>

Variable	Range
Personnel	may include: <ul style="list-style-type: none"> Contractors

	<ul style="list-style-type: none"> • Drillers • Drivers • Holders of appropriate tickets • Inspectors • Licensed operators • Maintenance staff • Personnel authorised by mine management • Service personnel • Supervisors • Surveyors • Trades persons 		
Equipment	<p>may include:</p> <ul style="list-style-type: none"> • Approved anchor points • Approved charge hose • Approved cord cutters • Lanyatels (safety rope) • Lights • Line/String • Paint • Scaling bar • Signage • Tape measure • Recommended/required PPE 		
Potential risks and hazards	<p>may include:</p> <ul style="list-style-type: none"> • Broken detonation leads • Contaminants • Eye hazards (flying chips) • Falling rock when collaring • Faulty equipment • Ground conditions • High air and water pressures • High voltage electricity • Hydraulic oil pressure • Lack of ventilation • Misfires • Overhanging rock • Tipping hazards • Unauthorised personnel • Wet holes • Uncontrolled radio frequencies and transmitters 		
Dust suppressant and extraction methods	<p>may include:</p> <ul style="list-style-type: none"> • Mobile/fixed sprays • Screens (vent doors, vent blinds) • Use of water trucks • Ventilation bags operational • Watering down site 		
Services	<p>may include:</p> <ul style="list-style-type: none"> • Compressed air 		
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	<ul style="list-style-type: none"> • De-watering pumps • Electricity • Ventilation • Water
Physical barricades	<p>may be physical or manned and may include:</p> <ul style="list-style-type: none"> • Cable across drive (wire, chain) • Witches hats, barricade tape
Signage	<p>may include:</p> <ul style="list-style-type: none"> • Access requirements • Safety • Type of site
Current relevant legislation, codes, regulations and standards	<p>may include:</p> <ul style="list-style-type: none"> • Relevant Ethiopian Standards • Explosives regulations • Ethiopian Explosives Code • Duty of Care • Environmental Agencies regulations • Environmental Protection Act • Isolation procedures • Manufacturers' specifications and recommendations • Mine Regulations Act • Occupational Health and Safety legislation • Site regulations and procedures • Lead Code of Practice
Visual inspection	<p>may include:</p> <ul style="list-style-type: none"> • Access • Ground conditions • Ground support • Ventilation

Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • Conducting an activity safely and efficiently • Achieving quality and productivity targets • Adhering to and understanding relevant legislative requirements • Adhering to and understanding environmental and heritage issues
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • Dewatering procedures and characteristics • Drilling procedures • Environmental procedures • Equipment safety requirements • Geological and technical data (basic) • Ground support characteristics and applications • Hazardous goods procedures (handling and transport) • Inspection procedures • Isolation procedures • Manufacturers' specifications

	<ul style="list-style-type: none"> • Mining regulations • Operational procedures and checks • Site procedures • Start up and shut down procedures • Underground procedures • Working knowledge of all stope areas
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • Drilling techniques • use Hand tools • Hazard identification • Monitoring • use Power tools • Report defects
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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level II	
Unit Title	Cut, Weld and Bend Materials
Unit Code	MIN EDD2 17 0114
Unit Descriptor	<p>This unit covers the cutting, welding and bending of materials in resources and infrastructure industries. It includes the planning and preparation for the work, the setting up and testing of the equipment, the cutting, heating and bending of materials using oxyacetylene, the shutdown of equipment and the completion of clean-up activities.</p> <p>This unit covers the cutting, non load-bearing welding and bending of materials using manual metal arc welding, oxyacetylene and cutting equipment and systems and LPG. It is appropriate for those working in operational, service and maintenance roles, at worksites within: Civil construction, Coal mining, Drilling, Extractive industries , and Metalliferous mining</p>

Elements	Performance Criteria
1. Plan and prepare	<p>1.1 Compliance documentation relevant to the cutting, welding and bending of materials is accessed, interpreted and applied.</p> <p>1.2 Work instructions are obtained, confirmed and applied for the allocated work.</p> <p>1.3 Safety requirements are followed in accordance with safety plans and policies.</p> <p>1.4 Signage/barricade requirements are identified and implemented.</p> <p>1.5 Plant, tools and equipment are selected to carry out tasks that are consistent with the requirements of the job, and checked for serviceability and any faults are rectified or reported prior to commencement.</p> <p>1.6 Material quantity requirements are calculated in accordance with plans and/or specifications.</p> <p>1.7 Materials are identified, obtained, prepared, safely handled and located to be ready for use appropriate to the work application.</p> <p>1.8 Environmental protection requirements are identified and applied for the project in accordance with environmental plans and regulatory obligations.</p>
2. Set up and test equipment	<p>2.1 Correct fire extinguisher to be readily accessible is selected and located prior to and during operations.</p> <p>2.2 Regulators are attached to Oxy and Acetylene bottles in accordance with manufacturer's specifications and OHS regulations.</p> <p>2.3 Lines to manufacturer's recommendations are purged prior to lighting up.</p> <p>2.4 Equipment is tested for leaks and corrective action undertaken or faults are reported.</p>

	2.5 Correct pressures and cutting tips are selected in accordance with material to be cut and manufacturer's specifications.
3. Cut material using oxyacetylene	<p>3.1 Material ready for cutting is accurately marked and secured or clamped.</p> <p>3.2 Torch is lighted correctly and safely according to manufacturer's specifications.</p> <p>3.3 Setting of flame is adjusted for cutting to manufacturer's recommendations.</p> <p>3.4 Correct cutting position is adopted during cutting to set out mark.</p>
4. Cut and weld materials using electric welding equipment	<p>4.1 Test runs are undertaken and verified in accordance with manufacturer instructions and site specifications.</p> <p>4.2 Welding and cutting are carried out in accordance with site procedures.</p> <p>4.3 Welds are cleaned using appropriate tools and techniques.</p> <p>4.4 Weld and cut specifications are confirmed by visual inspection and defects identified and repaired.</p>
5. Heat and bend material	<p>5.1 Material ready for bending is accurately marked and secured or clamped.</p> <p>5.2 Torch is lighted correctly and safely according to manufacturer's specifications.</p> <p>5.3 Heat is applied to specified material and so weakening effects of the heating process are minimized.</p> <p>5.4 Material is bend to specification and cooled correctly.</p>
6. Shutdown	<p>6.1 Torch is switched off according to manufacturer's specifications.</p> <p>6.2 Gas supply is shut off according to manufacturer's specifications.</p>
7. Clean up	<p>7.1 Work area materials is cleared and disposed of, reused or recycled in accordance with the legislation/regulations/code of practice and job specification.</p> <p>7.2 Plant, tools and equipment are cleaned, checked, maintained and stored in accordance with manufacturer's recommendations and standard work practices.</p> <p>7.3 Records are processed in accordance with site requirements.</p>

Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> legislative, organization and site requirements and procedures manufacturer's guidelines and specifications Ethiopian standards code of practice Employment and workplace relations legislation Equal Employment Opportunity and Disability Discrimination and legislation

Work instructions	<p>may include:</p> <ul style="list-style-type: none"> • verbal or written and graphical instructions, signage, work schedules/plans/specifications, work bulletins, charts and hand drawings, memos, Material Safety Data Sheets (MSDS) and diagrams or sketches • plans and specifications • quality requirements, including: dimensions, tolerances, standards of work and material standards • operational details • safe work procedures
Safety requirements	<p>may include:</p> <ul style="list-style-type: none"> • protective clothing and equipment • use of tools and equipment • workplace environment and safety • handling of materials • use of firefighting equipment • use of First Aid equipment • hazards and risks control, including: <ul style="list-style-type: none"> ➢ uneven/unstable terrain ➢ trees ➢ fires ➢ overhead and underground services ➢ bridges ➢ buildings ➢ traffic ➢ embankments ➢ excavations and cuttings ➢ structures and ➢ hazardous materials and substances • safe operating procedures: <ul style="list-style-type: none"> ➢ underground and overhead services ➢ other machines ➢ personnel restricted access barriers ➢ traffic control ➢ working at heights ➢ working in proximity to others ➢ worksite visitors and ➢ the public • emergency procedures, including: <ul style="list-style-type: none"> ➢ emergency shutdown and stopping ➢ extinguishing equipment fires ➢ organizational First Aid requirements and ➢ evacuation
Environmental protection requirements	<p>may include:</p> <ul style="list-style-type: none"> • organizational/project environmental management plan • waste management • water quality protection • noise, vibration and dust management and • clean-up management

Equipment	<p>may include:</p> <ul style="list-style-type: none"> • cylinders • regulators • gas tubing • cutting blowpipes • flint lighters • measuring tapes/rules • clamps and • support stands
Materials	<p>are to include:</p> <ul style="list-style-type: none"> • deformed bars, plain rods, mesh sheets of plain bars and mesh sheets of deformed bars, cutting consumables and may include scaffolding components, pipe sections and structural steel sections
Cutting of steel	<p>may include:</p> <ul style="list-style-type: none"> • cutting up of waste for salvage • cutting reinforcement steel and • cutting holes in plate
Bending	<p>is to include:</p> <ul style="list-style-type: none"> • reinforcement steel

Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions for cutting, welding and bending of materials • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of the cutting, welding and bending of materials • working with others to undertake and complete the cutting, welding and bending of materials that meets all of the required outcomes • consistent timely completion of cutting, welding and bending of materials that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • workplace and equipment safety requirements • quality requirements • construction and steel fixing terminology • manual metal arc welding, oxyacetylene and LPG heating and cutting equipment types, characteristics, uses and limitations • manual metal arc welding, oxyacetylene and LPG heating and cutting equipment set-up and operating techniques • the types and properties of steel fixing materials • processes for the calculation of material requirements • Material Safety Data Sheets (MSDS) • plans, drawings and specifications • materials handling, storage and environmentally friendly waste management • JSA's/safe work method statement

Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures • apply manufacturer's requirements and procedures • apply operational safety requirements • access, interpret and apply technical information • apply hand-eye coordination • read and interpret sketches or basic drawings • identify and select from a range of welding equipment and accessories • identify and match cutting equipment with specified tasks • 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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level II	
Unit Title	Carryout Operational Maintenance
Unit Code	MIN EDD2 18 0114
Unit Descriptor	This unit covers all components of maintenance including mechanical, hydraulic and electrical skills.

Elements	Performance Criteria
1. Do pre-drilling checks and maintenance.	1.1 Checks on drill are carried out. 1.2 Mine site /company checklist sheet is completed. 1.3 Appropriate personal protective equipment is selected. 1.4 All systems are lubricated where necessary. 1.5 Fluid levels and bleed topped up where necessary. 1.6 Filters are checked and cleaned/replaced if necessary. 1.7 Security of all circulation systems is checked, as required. 1.8 Cabin, seat belts and windscreen are kept clean and wind screened washer functioning.
2. Perform machine checks regularly and efficiently, as prescribed in the operator's manual/ company procedures.	2.1 Policies, procedures , safety rules and site specific instructions are observed. 2.2 Timed and regular equipment inspection, servicing and lubrication are carried out in accordance with manufacturer's recommendations/ company procedures and record details. 2.3 Faults or potential faults are identified and reported immediately. 2.4 Isolation/tag out/lock out procedure is observed. 2.5 Requirement for repair or maintenance and critical time line is identified, recorded and/or reported for rectification. 2.6 Effectiveness of maintenance performed is monitored.
3. Maintain all down hole tools and other drilling consumables.	3.1 Procedures are followed for component maintenance, and carried out safely and according to instructions. 3.2 Site procedures are followed for maintaining and storing tools and consumables.
4. Perform machinery maintenance.	4.1 Equipment breakdown is minimized by regular servicing and maintenance and performance of overhauls to manufacturer's specifications. 4.2 Tag out/lock out is used when servicing. 4.3 Minor servicing of equipment is carried out by avoiding disruption to production. 4.4 Routine inspection, servicing, lubrication and housekeeping tasks are carried out to manufacturer's and/or site requirements.

	<p>4.5 Instructions on maintenance procedures, lubrication tasks, filter change/service are read and followed accurately.</p> <p>4.6 Wear parts are identified and changed, and relative frequency of replacement is recorded.</p> <p>4.7 Operational faults are identified and hydraulic systems maintained.</p> <p>4.8 Service and repair requirements are reported and action is taken according to company procedures.</p> <p>4.9 Diagnostic and troubleshooting techniques are used and action is taken.</p>
5. Perform field repairs.	<p>5.1 Equipment faults are isolated and rectified.</p> <p>5.2 Extent of repair needed is identified and spare parts are obtained.</p> <p>5.3 Tools required for maintenance and repairs are identified, selected and used correctly.</p> <p>5.4 Re-usable components or accessories are returned in accordance with site requirements.</p> <p>5.5 Equipment and re-set in response to variations in production needs are reviewed.</p> <p>5.6 System faults are recognized and appropriate responses formulated within agreed time lines.</p> <p>5.7 Records of action taken are maintained in accordance with site requirements.</p> <p>5.8 A given drill component is dismantles, assessed, serviced, repaired, reassembled and tested in a safe manner.</p>

Variable	Range
On drilling site	<p>may include:</p> <ul style="list-style-type: none"> • Regular visual inspection including pre-start neutral for all control levers • Check on correct operation • Observation of display instruments and gauges function • Observation of recording instruments and gauges • Hydraulic system (including filters, strainers, hose, hose fitting and oils) • Air systems and filters • Vehicles (including wheels, tyres, clutch, brakes and fluid levels) • Batteries
Procedures	<p>may include:</p> <ul style="list-style-type: none"> • Effective storage • Use of desiccants • Store chemicals (cement, bentonite, and etc) in safe dry conditions secure from livestock
Safety rules	include:

	<ul style="list-style-type: none"> • Tag out/lock out procedures • Hazard identification and control/Job Safety Analysis (JSA) • Checks of equipment used
Symptoms of faults	<p>May include:</p> <ul style="list-style-type: none"> • Indications on instruments or gauges • Noises • Vibrations • Smells • Overheated hydraulic motors or lines • Visual indicators (e.g. smoke)
Diagnostic and troubleshooting procedures	<p>may include:</p> <ul style="list-style-type: none"> • Diagnostics built into equipment • Diagnostics applying externally • Troubleshooting procedures recommended by manufacturers • Troubleshooting procedures developed by organisation • Knowledge of sources of help for more complex problems
Lubricants and other service materials required for equipment on site	<p>may include:</p> <ul style="list-style-type: none"> • Oils (engine, gear box, hydraulic) • Greases • Rig spare parts • Down hole tools spare parts
Machinery maintenance	<p>may include:</p> <ul style="list-style-type: none"> • Operating checks • Daily checks • Programmed maintenance • Breakdown maintenance and prescribed lubrication
Reporting requirements	<p>may include:</p> <ul style="list-style-type: none"> • Tool records • Service and maintenance • Meters drilled • Operating hours since last service

Evidence Guide			
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • Operational safety compliance with occupational health, safety and environmental legislation/regulations expressed through organizational policies and procedures • Hazards/potential hazards • Diagnostic and troubleshooting procedures • Compliance with company safety codes • Immediate identification and reporting of faults/potential faults • Ability to maintain records legibly and accurately • Ability to adapt to new situations using appropriate strategies (e.g. innovation, persistence, resourcefulness) 		
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • Familiarity with manufacturers' handbooks 		
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	<ul style="list-style-type: none"> • Characteristics, technical capabilities and limitations of equipment • Environmental aspects • Mechanical/electrical/hydraulic systems and power tools • Isolation and tag out procedures • Lubricants and their uses • All engine electric and hydraulic indicators and gauges • Transmission and drive systems • Recording and reporting
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • In service functions and procedures
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and Equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competency may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Mineral Exploration and Development Drilling Level II	
Unit Title	Operate and Maintain Ancillary Equipment
Unit Code	MIN EDD2 19 0114
Unit Descriptor	This unit covers the operation and maintenance of ancillary equipment in the drilling industry. It includes planning and preparing for operating and maintaining ancillary equipment, maintaining pumps, operating, maintaining and repairing gate valves associated with the mud system, and operating and maintaining chemical mixing pumps and equipment. This unit is appropriate for those working in an operational role at worksites within drilling.

Elements	Performance Criteria
1. Plan and prepare for operating and maintaining ancillary equipment	<p>1.1. Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2. Work instructions are obtained, confirmed and applied for the allocated task.</p> <p>1.3. All potential hazards are identified, managed and reported in compliance with statutory requirements.</p> <p>1.4. Coordination requirements are resolved with others at the site prior to commencing and during work activities and ensure briefings/handover details are read/passed on.</p> <p>1.5. Availability and status of necessary permits are confirmed to work in accordance with operational and legislative requirements.</p> <p>1.6. Availability of necessary third party utilities is confirmed.</p>
2. Maintain pumps	<p>2.1. Lubrication, brake cooling and oil flushing pumps are inspected for leaks or abnormal operation.</p> <p>2.2. Pumps are lubricated.</p> <p>2.3. Packing in centrifugal pumps is replaced.</p>
3. Operate, maintain and repair gate valves associated with mud system	<p>3.1. Personal protective equipment is identified, located and applied.</p> <p>3.2. Valves are aligned, opened and closed in accordance with operating procedures.</p> <p>3.3. Valve stems are lubricated as required.</p> <p>3.4. Defective parts are identified in valves and replaced.</p>
4. Operate and maintain chemical mixing pumps and equipment	<p>4.1. Faults or potential faults are identified and reported immediately.</p> <p>4.2. Requirement is identified, recorded and/or reported for repair or maintenance.</p>

	<p>4.3. Equipment checks are performed regularly and efficiently as prescribed in the operator's manual.</p> <p>4.4. Valves are lined up properly.</p> <p>4.5. Mixing and transfer pumps are engaged.</p> <p>4.6. Valves and mixing pumps are lubricated and pumps transferred.</p> <p>4.7. Defective or malfunctioning parts and valves are replaced on pumps.</p> <p>4.8. Mixing hopper and area are cleaned and inspected.</p> <p>4.9. Equipment is isolated as required.</p>
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Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organisational and site requirements and procedures • manufacturer's guidelines and specifications • Relevant Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation • safe working practices
Work instructions	<p>may include:</p> <ul style="list-style-type: none"> • nature and scope of tasks • specifications • quality of finished works • achieved targets • operational conditions • obtaining of required permits • site layout • out of bounds areas • worksite inspection requirements • lighting conditions • plant of equipment defects • coordination requirements or issues • contamination control requirements • environmental control requirements • barricade and signage requirements
Hazards	<p>may include:</p> <ul style="list-style-type: none"> • working in proximity to drilling rig
Statutory requirements	<p>may include:</p> <ul style="list-style-type: none"> • OHS • duty of care • environment • (PSLA) Petroleum Submerged Lands Act (where relevant) • petroleum regulations

Coordination requirements	<p>may include:</p> <ul style="list-style-type: none"> • other equipment operators • maintenance personnel • supervisors • site personnel
Briefing/handover details	<p>may include:</p> <ul style="list-style-type: none"> • task specific information • pre-tour safety meeting • location of potential hazards • task specific - Job Safety Analysis (JSA) • supervision of floor crew • pump equipment maintenance • safety briefing/induction • weekly safety meetings • agreed procedures may include: <ul style="list-style-type: none"> ➢ company ➢ facility ➢ client ➢ toolbox ➢ permit to work
Personal protective equipment	<p>may include:</p> <ul style="list-style-type: none"> • eye protection • hearing protection • gloves • footwear • hard hats • respirators
Record	<p>may include recording:</p> <ul style="list-style-type: none"> • service and maintenance details • replacement parts
Equipment	<p>may include:</p> <ul style="list-style-type: none"> • mixing pumps • change pumps • desander • desilter • centrifuges • degaser • piping • valves • agitators • caustic mixing system • mud guns • mixing hoppers • shearing devices • (PVT) system • pit volume totaliser • lubrication pumps • bolt material system

	<ul style="list-style-type: none"> • chemical handling system • dust/fuel extraction system
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Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions for operating and maintaining ancillary equipment • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of ancillary equipment operation and maintenance • working with others to undertake and complete the operation and maintenance of ancillary equipment that meets all of the required outcomes • consistent timely completion of ancillary equipment operation and maintenance that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • mud system ancillary equipment • company and statutory safety guidelines, procedures and practices • safe operating procedures when operating equipment • rig maintenance • normal drilling operations • use of communication methods, including: <ul style="list-style-type: none"> ➢ 2-way radio ➢ intercom ➢ telephone ➢ oral instruction ➢ written instruction ➢ hand signals ➢ telephone ➢ public address system • weather conditions, including: <ul style="list-style-type: none"> ➢ day/night ➢ storm/lightning ➢ hot/cold ➢ wet/dry • non-routine drilling operations • discharge types and characteristics, including liquids, gases and solids • material characteristics, including flammable, toxic, corrosive and explosive • man management/rig management • company maintenance system • permit to work system • equipment isolation procedures • specialised hand tools

Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures for operating and maintaining ancillary equipment • recognise and report equipment malfunction or failure • supervise and train subordinates to provided standards • work as directed by driller timely and efficiently • maintain pumps in pump room • align, open and close valves as appropriate • use safety equipment, including fire protection, First Aid and vessel entry equipment • lubricate valve stems • replace defective parts in valves • operate and maintain chemical mixing pumps and equipment • clean and inspect mixing hopper and mixing area • isolate and lock out equipment as required
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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level II	
Unit Title	Maintain and Monitor Site Quality Standards
Unit Code	MIN EDD2 20 0114
Unit Descriptor	<p>This unit covers the maintenance and monitoring of site quality standards in the resources and infrastructure industries. It includes planning and preparing for quality work outcomes, applying quality systems to individual work activities, and monitoring and reporting quality standards on a worksite.</p> <p>This unit is appropriate for those working in an assistant role at worksites within: Civil construction, Coal mining, Drilling, Extractive industries, and Metalliferous mining.</p>

Elements	Performance Criteria
1. Plan, prepare for quality work outcomes	<p>1.1. Compliance documentation including quality standards relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2. Performance indicators for individual work are identified and agreed on with the appropriate persons.</p> <p>1.3. Ensure work is completed within time, quality, cost and productivity parameters.</p> <p>1.4. Work is planned to facilitate the achievement of quality standards.</p>
2. Apply quality systems to individual work activities	<p>2.1. Work is carried out to relevant quality procedures.</p> <p>2.2. Performance indicators are adjusted and agreed on to meet changing circumstances with appropriate personnel.</p> <p>2.3. Procedure improvements are suggested and implemented with relevant people including corrective actions.</p> <p>2.4. Relevant quality documentation is completed in accordance with site requirements.</p>
3. Monitor and report quality standards on a worksite	<p>3.1. Quality of outputs is monitored and non-compliance is identified.</p> <p>3.2. Work processes are monitored, incidents reported and local risk control processes applied to minimize quality non-compliance.</p> <p>3.3. Information about variations in quality is communicated to appropriate personnel.</p>

Variable	Range
Compliance documentation and quality standards	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organisation and site requirements and procedures manufacturer's guidelines and specifications • Relevant Ethiopian standards • site management plans • code of practice, recognised standards or guidelines

	<ul style="list-style-type: none"> • approved code of practice • systems of health and safety • customer specifications • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Performance indicators	<p>may include:</p> <ul style="list-style-type: none"> • time parameters • quantity • productivity parameters • quality parameters • cost parameters • time targets for own work • criteria for evaluation of own work • measures to avoid wastage • criteria for measurement of internal and external customer satisfaction • processes to ensure 'right first time' approach
Relevant quality documentation	<p>may include:</p> <ul style="list-style-type: none"> • daily production reports • specific product or process reports or records
Appropriate personnel	<p>may include:</p> <ul style="list-style-type: none"> • those for whom one has responsibility • line managers • staff representatives • colleagues • customers • suppliers

Evidence Guide

Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions for maintaining and monitoring site quality standards • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of maintenance and monitoring of site quality standards • working with others to undertake and complete the maintenance and monitoring of site quality standards that meets all of the required outcomes • consistent timely completion of maintenance and monitoring of site quality standards that safely, effectively and efficiently meets the required outcomes.
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • site/enterprise quality systems and processes • work planning processes • technical and operational capability and limitations of resources and workplace equipment • company and statutory guidelines, procedures and practices • reporting procedures

Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures for maintaining and monitoring site quality standards • maintain, monitor and recommend changes to system documents including reporting documents, work systems and/or plant • solve problems, particularly in teams, paying particular attention to safety issues and adjusting performance indicators to reflect changed circumstances • show initiative in adapting to changing work conditions or contexts particularly when working across a variety of work areas • access, interpret and apply information on relevant organisation policies, procedures and instructions • use mathematical ideas and techniques to complete quality documentation
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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level II	
Unit Title	Participate in Workplace Communication
Unit Code	MIN EDD2 21 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	<p>1.1 Specific and relevant information is accessed from appropriate sources.</p> <p>1.2 Effective questioning, active listening and speaking skills are used to gather and convey information.</p> <p>1.3 Appropriate medium is used to transfer information and ideas</p> <p>1.4 Appropriate non- verbal communication is used.</p> <p>1.5 Appropriate lines of communication with supervisors and colleagues are identified and followed.</p> <p>1.6 Defined workplace procedures for the location and storage of information are used.</p> <p>1.7 Personal interaction is carried out clearly and concisely.</p>
2. Participate in workplace meetings and discussions	<p>2.1 Team meetings are attended on time.</p> <p>2.2 Own opinions are clearly expressed and those of others are listened to without interruption.</p> <p>2.3 Meeting inputs are consistent with the meeting purpose and established protocols.</p> <p>2.4 Workplace interactions are conducted in a courteous manner.</p> <p>2.5 Questions about simple routine workplace procedures and matters concerning working conditions of employment are asked and responded to.</p> <p>2.6 Meetings outcomes are interpreted and implemented.</p>
3. Complete relevant work related documents	<p>3.1 Range of forms relating to conditions of employment is completed accurately and legibly.</p> <p>3.2 Workplace data is recorded on standard workplace forms and documents.</p> <p>3.3 Basic mathematical processes are used for routine calculations.</p> <p>3.4 Errors in recording information on forms/ documents are identified and properly acted upon.</p> <p>3.5 Reporting requirements to supervisor are completed according to organizational guidelines.</p>

Variable	Range
Appropriate sources	May include but not limited to: <ul style="list-style-type: none"> • Team members • Suppliers • Trade personnel • Local government • Industry bodies
Medium	May include but not limited to: <ul style="list-style-type: none"> • Memorandum • Circular • Notice • Information discussion • Follow-up or verbal instructions • Face to face communication
Storage	May include but not limited to: <ul style="list-style-type: none"> • Manual filing system • Computer-based filing system
Protocols	May include but not limited to: <ul style="list-style-type: none"> • Observing meeting • Compliance with meeting decisions • Obeying meeting instructions
Workplace interactions	May include but not limited to: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • Personnel forms, telephone message forms, safety reports

Evidence Guide	
Critical Aspects of Competency	Demonstrates skills and knowledge to: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • 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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level II	
Unit Title	Work in Team Environment
Unit Code	MIN EDD2 22 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	<p>1.1 The role and objective of the team are identified from available sources of information.</p> <p>1.2 Team parameters, reporting relationships and responsibilities are identified from team discussions and appropriate external sources.</p>
2. Identify own role and responsibility within team	<p>2.1 Individual role and responsibilities within the team environment are identified.</p> <p>2.2 Roles and responsibility of other team members are identified and recognized.</p> <p>2.3 Reporting relationships within team and external to team are identified.</p>
3. Work as a team member	<p>3.1 Effective and appropriate forms of communications used and interactions undertaken with team members who contribute to known team activities and objectives.</p> <p>3.2 Effective and appropriate contributions are made to complement team activities and objectives, based on individual skills and competencies and workplace context.</p> <p>3.3 Protocols are observed in reporting using standard operating procedures.</p> <p>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.</p>

Variable	Range
Role and objective of team	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • 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	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Standard operating and/or other workplace procedures • Job procedures • Machine/equipment manufacturer's specifications and instructions • Organizational or external personnel • Client/supplier instructions

	<ul style="list-style-type: none"> • Quality standards • OHS and environmental standards
Workplace context	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • 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	<p>Demonstrates skills and knowledge to:</p> <ul style="list-style-type: none"> • 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	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • Communication process • Team structure • Team roles • Group planning and decision making
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • Communicate appropriately, consistent with the culture of the workplace
Resource Implications	<p>Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competence may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Mineral Exploration and Development Drilling Level II	
Unit Title	Develop Business Practice
Unit Code	MIN EDD2 23 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	<p>1.1 Business opportunities are investigated and identified.</p> <p>1.2 Feasibility study is undertaken to determine likely business viability.</p> <p>1.3 Market research on product or service is undertaken.</p> <p>1.4 Assistance with feasibility study of specialist and relevant parties is sought as required.</p> <p>1.5 Impact of emerging or changing technology including e-commerce, on business operations is evaluated.</p> <p>1.6 Practicability of business opportunity is assessed in line with perceived risks, returns sought and resources available.</p> <p>1.7 Business plan is completed for operation.</p>
2. Identify personal business skills	<p>2.1 Financial and business skills available are identified and taken into account when business opportunities are researched.</p> <p>2.2 Personal skills/attributes are assessed and matched against those perceived as necessary for a particular business opportunity.</p> <p>2.3 Business risks are identified and assessed according to resources available and personal preferences.</p>
3. Plan for establishment of business operation	<p>3.1 Business structure and operations are determined and documented.</p> <p>3.2 Procedures are developed and documented to guide operations.</p> <p>3.3 Financial backing is secured for business operation.</p> <p>3.4 Business legal and regulatory requirements are identified and complied.</p> <p>3.5 Human and physical resources required to commence business operation are determined.</p> <p>3.6 Recruitment strategies are developed and implemented.</p>
4. Implement establishment plan	<p>4.1 Marketing of business operation is undertaken</p> <p>4.2 Physical and human resources are obtained to implement business operation.</p>

	<p>4.3 Operational unit is established to support and coordinate business operation.</p> <p>4.4 Monitoring process is developed and implemented for managing operation.</p> <p>4.5 Legal documents are carefully maintained and relevant records are kept and updated to ensure validity and accessibility.</p> <p>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.</p> <p>4.7 Options for leasing/ownership of business premises identified and contractual arrangements are completed in accordance with the business plan.</p>
5. Review implementation process	<p>5.1 Review process for implementation of business operation is developed and implemented.</p> <p>5.2 Improvements in business operation and associated management process are identified.</p> <p>5.3 Identified improvements are implemented and monitored for effectiveness.</p>

Variable	Range
Business opportunities	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • 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	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • 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	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Chamber of commerce • Financial planners and financial institution representatives, business planning specialists and marketing specialists • accountants • lawyers and providers of legal advice • government agencies

	<ul style="list-style-type: none"> • industry/trade associations • online gateways • business brokers/business consultants
Personal skills/attributes	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • technical and/ or specialist skills • business knowledge and skills • entrepreneurship • willingness to take risks
Business risks	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • 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	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • software and hardware • office premises • communications equipment • specialist services through outsourcing, contracting and consultancy • staff • vehicles
Operational unit	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • 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	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • 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	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • 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 of Competence	<p>Demonstrates skills and knowledge in:</p> <ul style="list-style-type: none"> • 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
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	<ul style="list-style-type: none"> • 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	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • 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	<p>Demonstrate skills of:</p> <ul style="list-style-type: none"> • 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 		
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	<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level II	
Unit Title	Standardize and Sustain 3S
Unit Code	MIN EDD2 24 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.	<p>1.1 Work instructions are used to determine job requirements, including method, material and equipment.</p> <p>1.2 Job specifications are read and interpreted following working manual.</p> <p>1.3 OHS requirements, including dust and fume collection, breathing apparatus and eye and ear personal protection needs are observed throughout the work.</p> <p>1.4 Safety equipment and tools are identified and checked for safe and effective operation.</p> <p>1.5 Tools and equipment are prepared and used to implement 3S.</p>
2. Standardize 3S.	<p>2.1 Plan is prepared and used to standardize 3S activities.</p> <p>2.2 Tools and techniques to standardize 3S are prepared and implemented based on relevant procedures.</p> <p>2.3 Checklists are followed for standardize activities and reported to relevant personnel.</p> <p>2.4 The workplace is kept to the specified standard.</p> <p>2.5 Problems are avoided by standardizing activities.</p>
3. Sustain 3S.	<p>3.1 Plan is prepared and followed to standardize 3S activities.</p> <p>3.2 Tools and techniques to sustain 3S are discussed, prepared and implemented based on relevant procedures.</p> <p>3.3 Workplace is inspected regularly for compliance to specified standard and sustainability of 3S techniques.</p> <p>3.4 Workplace is cleaned up after completion of job and before commencing next job or end of shift.</p> <p>3.5 Situations are identified where compliance to standards is unlikely and actions specified in procedures are taken.</p> <p>3.6 Improvements are recommended to lift the level of compliance in the workplace.</p> <p>3.7 Checklists are followed to sustain activities and reported to relevant personnel.</p>

3.8 Problems are avoided by sustaining activities.

Variable	Range
OHS requirements	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • 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	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • dust masks / goggles • glove • working cloth • first aid • safety shoes
Tools and equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • paint • hook • sticker • signboard • nails • shelves • chip wood • sponge • broom • pencil • shadow board/ tools board
Tools and techniques	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • 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	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • 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	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • verbal responses • data entry into enterprise database • brief written reports using enterprise report formats
Relevant personnel	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • supervisors, managers and quality managers • administrative, laboratory and production personnel • internal/external contractors, customers and suppliers
Tools and techniques	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> ➢ Top management Patrol ➢ 5S Committee members and Promotion office Patrol ➢ Mutual patrol ➢ Self-patrol ➢ Checklist patrol ➢ Camera patrol

Evidence Guide	
Critical Aspects of Competence	<p>Demonstrates skills and knowledge to:</p> <ul style="list-style-type: none"> • Discuss the relationship between Kaizen elements. • Standardize and sustain 3S activities by applying appropriate tools and techniques.
Underpinning Knowledge and Attitudes	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • 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

	<ul style="list-style-type: none"> • 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	<p>Demonstrates skills of:</p> <ul style="list-style-type: none"> • 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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level III	
Unit Title	Setup and Prepare for Drilling Operations
Unit Code	MIN EDD3 01 0114
Unit Descriptor	<p>This unit covers the setting up and preparing for drilling operations in resources and infrastructure industries. It includes planning for setting up and preparing for drilling operations; locating the rig at whole position; setting up drill and equipment; and diagnosing problems.</p> <p>This unit is appropriate for those working in a operational roles, at worksites within drilling.</p>

Elements	Performance Criteria
1. Plan for drilling operations	<p>1.1 Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2 Work instructions about the aim, scope, purpose and location of and access to the drilling job are received and likely geological formations determined for drilling job.</p> <p>1.3 Required hole parameters (e.g. size, depth) are checked.</p> <p>1.4 All potential hazards are identified, managed and reported.</p> <p>1.5 Coordination requirements are resolved with others at the site prior to commencing and during work activities.</p> <p>1.6 Location and nature of any installed services are determined near or crossing the proposed drill plan.</p> <p>1.7 All necessary permits or consents are obtained, where required (e.g. to construct or dispose of waste).</p> <p>1.8 Contingency plans are developed for changes in geological conditions.</p>
2. Prepare to drill	<p>2.1 All required personnel, equipment and supplies are checked to be available.</p> <p>2.2 Required personal protective equipment is selected and worn.</p> <p>2.3 Equipment is checked in good operational condition.</p> <p>2.4 The drill site, noting any services, hazards, obstacles or other items relevant to the job are walked and inspected.</p> <p>2.5 Any services are identified by inspection and from preliminary investigation and exact location (e.g. by digging) is confirmed.</p> <p>2.6 Hazard control measures are implemented for identified hazards.</p> <p>2.7 Safety barriers are erected or placed where needed.</p> <p>2.8 Check all modes of communication.</p>

	<p>2.9 Suitable lay down areas are selected for separate storage of chemicals and fuels or other incompatible items.</p> <p>2.10 Locations are selected for ancillary equipment to provide maximum efficiency and minimal risk to personnel.</p>
3. Set up drill and equipment	<p>3.1 Boreholes plans are interpreted and positioned accurately from plans using tape measure or measurement wheel.</p> <p>3.2 A solid foundation is ensured for the rig.</p> <p>3.3 A site sketch is constructed to show hole positions and site features.</p> <p>3.4 Rig up is set over peg or marker and drill stabilized.</p> <p>3.5 Mast is aligned and secured at correct angle.</p> <p>3.6 Ancillary equipment is positioned accurately.</p> <p>3.7 Borehole collar levels or relative levels of bore collar are recorded to some particular site feature or reduced level datum.</p>
4. Diagnose problems	<p>4.1. Symptoms of problem are recognized.</p> <p>4.2. Causes are identified and isolated and solution determined.</p> <p>4.3. Solution is implemented if within scope of authority and competence.</p> <p>4.4. Help is sought if problem is too complex.</p> <p>4.5. Solution is implemented as directed.</p>

Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organisational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • code of practice • Employment and Workplace Relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Work instructions	<p>may come from:</p> <ul style="list-style-type: none"> • briefings, handovers, plans and work orders and may be written or verbal, formal or informal and may include: • nature and scope of tasks, including hole parameters, e.g. size and depth • permits required, e.g. dispose of waste • specifications • quality of finished works • achievement targets • operational conditions • obtaining of permits required

	<ul style="list-style-type: none"> • site layout • out of bounds areas • worksite inspection requirements • lighting conditions • plant or equipment defects • hazards and potential hazards • coordination requirements or issues • contamination control requirements • environmental control requirements • barricade and signage requirements
Hazards	<p>may include:</p> <ul style="list-style-type: none"> • obstacles • underground services • overhead power lines • uneven ground • unconsolidated ground
Coordination requirements	<p>may include:</p> <ul style="list-style-type: none"> • drill team members • other equipment operators • maintenance personnel • supervisors • mine personnel
Contingency plans	<p>may concern changes in:</p> <ul style="list-style-type: none"> • geological conditions • depths • materials used in construction
Personal protective equipment	<p>includes:</p> <ul style="list-style-type: none"> • steel-capped boots and hardhat • gloves • dust mask • eye and hearing protection • general protective and reflective clothing

Evidence Guide			
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • the requirements, procedures and instructions for setting up and preparing for drilling operations • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of the setting up and preparing for drilling operations • working with others to undertake and complete the setting up and preparing for drilling operations that meets all of the required outcomes • consistent timely completion of the setting up and preparing for drilling operations that safely, effectively and efficiently meets the required outcomes 		
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • equipment and its characteristics, technical capabilities and limitations 		
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	<ul style="list-style-type: none"> • operational and maintenance procedures, including: <ul style="list-style-type: none"> ➤ controlling flow off site ➤ disposing of waste ➤ no excess clearing ➤ prevention of spread of contaminants • soil sampling and basic geological knowledge, including classification of rocks, drill ability and stability • environmental requirements and procedures • fault finding and troubleshooting techniques • team work • communication systems, processes and procedures, e.g. 2-way radio
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures • operate machine • operate ancillary equipment • interpret graphical representation, including maps, diagrams • apply metric and imperial conversions • apply mathematical skills, including: <ul style="list-style-type: none"> ➤ addition ➤ subtraction ➤ multiplication ➤ division • apply appropriate instruments to measure: <ul style="list-style-type: none"> ➤ volume ➤ quantities ➤ mass ➤ weight ➤ length • using calculator • apply estimating skills, e.g. mental arithmetic, visualisation of size and quantity • apply basic geometry to interpret depth, direction and azimuth of a hole
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: <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level III	
Unit Title	Conduct Raise Boring
Unit Code	MIN EDD3 02 0114
Unit Descriptor	<p>This unit covers conducting raise boring in the metalliferous mining industry. It includes: planning, preparing and setting up for drilling; locating collar and drill pilot hole; drilling and monitoring progress of pilot hole; reaming raise bore; packing-up drill site; and carrying out operator maintenance and housekeeping activities.</p> <p>This unit is appropriate for those working in driller roles, in underground mines within: Drilling and Metalliferous mining.</p>

Elements	Performance Criteria
1. Plan and prepare for drilling.	<p>1.1. Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2. Shift changeover details, geo-technical reports and drill plan are obtained, confirmed and applied for the allocated task.</p> <p>1.3. Site conditions are inspected and assessed to identify and manage possible scaling requirements, misfires and other hazards and potential risk.</p> <p>1.4. Coordination requirements are resolved with others at the site prior to commencing and during work activities.</p> <p>1.5. Personal protective equipment appropriate for work activities is selected and worn.</p>
2. Set up for drilling.	<p>2.1. The raise bore drill rig site is set up.</p> <p>2.2. The drill rig on the prepared pad and position is located and alignment checked as specified according to drill plan.</p> <p>2.3. Drill rig is secured to the pad using recommended equipment and anchors.</p> <p>2.4. Drill rig is stood in specified position according to drilling plan.</p> <p>2.5. Components are connected to drill rig.</p> <p>2.6. Raise drill is tested for correct, safe operation.</p> <p>2.7. Rods needed are calculated to drill to depth, and drill rack set up.</p> <p>2.8. Drill rods and equipment are loaded onto drill rack.</p> <p>2.9. Equipment pre-start checks are conducted to ensure equipment is safe and ready to use.</p>
3. Locate collar and drill pilot hole.	<p>3.1. Collaring starter equipment is inspected and assembled.</p> <p>3.2. Dust suppression and extraction systems are installed.</p>

	<p>3.3. Drill direction is confirmed and set accurately and hole collared as specified in the drill plan.</p> <p>3.4. Assemblies are installed in collared hole to allow pilot hole drilling to be carried.</p>
4. Drill and monitor progress of pilot hole.	<p>4.1. Job-site is inspected for safe working conditions.</p> <p>4.2. Safety of driller and surrounding personnel is maintained.</p> <p>4.3. Drill plans are interpreted and holes are drilled to design.</p> <p>4.4. Equipment is operated safely within working environment limitations and ground conditions.</p> <p>4.5. Ground conditions are monitored and drilling techniques and components are adjusted to maintain efficient drilling operations.</p> <p>4.6. Drilling progress is monitored using appropriate equipment indicators.</p> <p>4.7. Drill "breakthrough" procedures are carried out and monitored and break through is inspected.</p> <p>4.8. Housing assemblies are removed.</p>
5. Ream raise bore.	<p>5.1. Personnel are coordinated to attach the reaming head to drill string.</p> <p>5.2. Communication is done with appropriate personnel to ensure safe removal of raise bore cuttings.</p> <p>5.3. Safety of driller and surrounding personnel is maintained.</p> <p>5.4. Equipment is operated safely within working environment limitations and ground conditions.</p> <p>5.5. Ground conditions and adjust reaming techniques are monitored to maintain efficient drilling operations.</p> <p>5.6. Appropriate action is diagnosed and taken to manage reaming problems and appropriate personnel are advised.</p> <p>5.7. Reamer is removed and stored.</p>
6. Pack-up drill site.	<p>6.1. Equipment is de-rigged.</p> <p>6.2. Equipment is confirmed to be ready for transport.</p>
7. Carry out operator maintenance.	<p>7.1. Shutdown procedures are carried out.</p> <p>7.2. Minor adjustments are serviced and made to equipment.</p> <p>7.3. Equipment is visually inspected and faults are reported and equipment available for routine operational servicing is made.</p>
8. Carry out housekeeping activities.	<p>8.1. Equipment is cleaned to maintain condition of equipment and safe and efficient operations are ensured.</p> <p>8.2. Site of debris and excess stores is cleared.</p>

	<p>8.3. Auxiliary service equipment is cleaned and stored.</p> <p>8.4. All required documentation is completed clearly, concisely and on time.</p> <p>8.5. End of shift information is passed on to oncoming shift.</p>
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Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Relevant Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Drill plan	<p>may include:</p> <ul style="list-style-type: none"> • access to inclines and decline • drive plan • equipment and resource allocations/requirements • face • geological details • verbal or written instructions • worksite details • services • stope • drilling angles • breakthrough
Hazards and potential risks	<p>may include:</p> <ul style="list-style-type: none"> • ground control failure • scaling requirements • lack of ventilation • vertical openings • limited egress • loose material on working surface • misfires • gases • entry by unauthorised personnel • unstable ground conditions • airborne dust and fibers • unstable footing • poor housekeeping • noise • rotating machinery (drill rods) • electrical hazards • airborne rock fragments
Coordination requirements	<p>may include:</p> <ul style="list-style-type: none"> • rig operator

	<ul style="list-style-type: none"> • observers • site communicator • LHD unit operator
Personal Protective Equipment	<p>may include:</p> <ul style="list-style-type: none"> • eye protection • hearing protection • gloves • helmet • boots
Setting up rig	<p>may involve:</p> <ul style="list-style-type: none"> • locating minor components • packing components with sandbags to ensure level and stability
Drill rigs	<p>may be:</p> <ul style="list-style-type: none"> • electric • hydraulic • pneumatic • rotary • track
Locating drill rig	<p>may involve:</p> <ul style="list-style-type: none"> • towing or manoeuvring the derrick sled on the pad • conducting final position adjustments • aligning sled rails • ensuring rails and pad are free of contaminants
Securing drill	<p>may include:</p> <ul style="list-style-type: none"> • collecting equipment for securing the rig • drilling hole through sled • cleaning out drill holes • inserting resin cartridges to secure bolts • tightening nuts on rock bolts
Standing drill rig	<p>may include:</p> <ul style="list-style-type: none"> • cleaning and greasing parts • checking turnbuckles • connecting to power supplies • standing and checking that rig is at appropriate angle • inserting back pins
Connecting components	<p>may include:</p> <ul style="list-style-type: none"> • hanging out cable hangers • checking, cleaning and connecting hydraulic • checking, cleaning and connecting air and water supplies • running out air and water lines to derrick • installing and testing pumps • connecting power and testing motor rotation
Testing raise drill	<p>may include:</p> <ul style="list-style-type: none"> • rig rotation • rig crosshead movement • rig slow and fast up and down • pipe loader grip close and open

	<ul style="list-style-type: none"> • pipe loader swing and tilt • emergency stops • indicator lights • components move freely • correct pressures are attained • computer readings
Equipment	<p>may include:</p> <ul style="list-style-type: none"> • collar piping • covering devices (plugs, cones, hessian bags) • drill rig (electric/hydraulic, pneumatic) • drilling components (drill rods, bits,) • extra lighting (flood lights) • flags • hoses • inclinometer • lifting and handling equipment • measuring tape • oils • paint (spray cans) • plates • recovery equipment • scaling bars • signs • support vehicles • tamping stick/tapes • witches hats • recommended/required PPE
Equipment pre-start checks	<p>may include:</p> <ul style="list-style-type: none"> • air filter restriction indicator • cab (horn, lights, air conditioner) • computer systems • display instrumentation and gauges (indicators, gauges, laser levels) • fire and suppression systems • fire extinguishers • fluid levels (hydraulic oil, coolant, grease, water, engine oil, fuel) • visual and audio warning devices and lights • drilling equipment (hydraulic hoses, bits and couplings) • drill rig platform, steps and hand rails
Inspecting collaring	<p>may include:</p> <ul style="list-style-type: none"> • ensuring that collaring bush wear is in recommended limits • ensuring that all components/parts are free from burrs and damage • ensuring that drill bit is free with no excessive play
Dust suppression and extraction methods	<p>may include:</p> <ul style="list-style-type: none"> • mobile/fixed sprays • screens (vent doors, vent blinds)

	<ul style="list-style-type: none"> • use of water trucks • ventilation bags operational • watering down site • Blooie housing
Job-site inspections	<p>may include:</p> <ul style="list-style-type: none"> • ventilation • air and water services • scaling requirements • pumps • signs and barricades • post firing rock falls • site housekeeping
Personnel	<p>may include:</p> <ul style="list-style-type: none"> • blasters • contractors • drillers • drivers • holders of appropriate tickets • inspectors • licensed operators • maintenance staff • personnel authorised by mine management • service personnel • supervisors • surveyors • tradespersons
Ground conditions	<p>may include:</p> <ul style="list-style-type: none"> • broken ground • dryness • location of water table • noise • slope of working surface • stability of ground • stable ground (compaction) amount of scale • ventilation characteristics (fumes, dust) • visibility/wet • breakthrough
Drilling/reaming techniques	<p>may include:</p> <ul style="list-style-type: none"> • adjustment to feed • removing debris • rotation • speed and pull force adjustments
Equipment indicators	<p>may include:</p> <ul style="list-style-type: none"> • pressure gauges • control panel readings • rotation • depth markers

Equipment cleaned	<p>may include:</p> <ul style="list-style-type: none"> • platform • steps and hand rails (removal of oil, grease, debris) • drill rods
Auxiliary services	<p>may include:</p> <ul style="list-style-type: none"> • compressed air • de-watering pumps • electricity • ventilation • water
Drilling/reaming problems	<p>may be:</p> <ul style="list-style-type: none"> • environmental • geological (ground conditions) • mechanical (bogged)

Evidence Guide

Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • the requirements, procedures and instructions for conducting raise boring • implementation of requirements, procedures and techniques for the safe, effective and efficient conducting of raise boring • working with others to undertake and complete raise boring that meets all of the required outcomes • consistent timely completion of raise boring that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • auxiliary services procedures • cleaning procedures • down hole problems • drilling procedures • calculating and setting drill angles • environmental procedures • drilling equipment processes, technical capability and limitations • equipment safety requirements • geological and technical data • inspection procedures • isolation procedures • manufacturer's specifications • mining regulations • operational procedures and checks • recovery procedures • site safety requirements • start-up and shutdown procedures • storage procedures • towing procedures • underground procedures • dealing with misfires

Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures • use clinometers • read and interpret plans • use hand and power tools • set up and load rod rack • set up and align a raise bore in readiness for drilling • attach and remove drill rods, bits and reamers • pack up raise drill in readiness for transport
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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level III	
Unit Title	Conduct Mud Rotary Drilling
Unit Code	MIN EDD3 03 0114
Unit Descriptor	<p>This unit covers the conduct of mud rotary drilling in resources and infrastructure industries. It includes planning and preparing for conducting of mud rotary drilling; operating mud rotary drills and fluid systems; maintaining equipment; and responding to problems.</p> <p>Rotary mud drilling is used for environmental, geotechnical, mineral exploration and water well drilling. This unit is appropriate for those working in a driller roles, at worksites within: Civil construction, Coal mining, Drilling, Extractive industries, and Metalliferous mining</p>

Elements	Performance Criteria
1. Plan and prepare for conducting of mud rotary drilling	<p>1.1. Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2. Work instructions are obtained, confirmed and applied for the allocated task.</p> <p>1.3. All potential hazards are identified, managed and reported.</p> <p>1.4. Coordination requirements are resolved with others at the site prior to commencing and during work activities.</p>
2. Operate mud rotary drill	<p>2.1. Appropriate drill string is made up.</p> <p>2.2. Bits, rods and casings are used.</p> <p>2.3. Hole collar is sealed.</p> <p>2.4. Drill is fed and rotated at right rate for the formation.</p> <p>2.5. Flow is interpreted from drill to determine conditions at bit.</p> <p>2.6. Flow rates are adjusted to give desired results.</p> <p>2.7. Drill bits and string components are checked for wear, gauge, dents and damaged threads.</p> <p>2.8. Casing and grout screens are used to correct zones or levels as required.</p>
3. Operate fluid system	<p>3.1. Required up hole velocity and the related fluid properties and feed rate are determined.</p> <p>3.2. Different types of strata are recognized.</p> <p>3.3. Mud system is designed and adjusted to suit geological conditions and changed to conditions which might be expected during the drilling.</p> <p>3.4. There is an adequate supply of water is ensured to the site for mud requirements and circulation loss zones.</p>

	<p>3.5. Appropriate formulation is made up using different types of mud and chemicals.</p> <p>3.6. Mud pits and systems are constructed to suit hole dimensions and site storage requirements.</p> <p>3.7. Flow rate and properties are monitored, checked and adjusted.</p> <p>3.8. Fluid is kept clean and lost circulation chlorinated/sanitized if required.</p> <p>3.9. Fluid reticulation systems are checked and adjusted.</p> <p>3.10. Drill fluids are disposed of correctly.</p>
4. Maintain equipment	<p>4.1. Wear is monitored and symptoms of malfunction are recognized.</p> <p>4.2. All equipment and hoses are checked.</p> <p>4.3. All seals and connections are monitored.</p> <p>4.4. Items needing attention are replaced, adjusted and reported.</p> <p>4.5. Gear and adjust glands are serviced where required.</p> <p>4.6. Rig is serviced regularly following service sheets for daily, weekly and monthly lubrication and checking.</p> <p>4.7. Oil drops are checked for signs of repairs needed.</p> <p>4.8. Inspection and/or service records is/are maintained.</p>
5. Respond to problems	<p>5.1. Possible operational problems in equipment, process or mud are identified.</p> <p>5.2. Problems needing action are determined.</p> <p>5.3. Possible fault causes are determined.</p> <p>5.4. Problem is rectified using appropriate solution(s) within area of responsibility.</p> <p>5.5. Follow through items initiated until final resolution has occurred.</p> <p>5.6. Problems outside area of responsibility are reported to designated person.</p>

Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organisational and site requirements and procedures • manufacturer's guidelines and specifications • Relevant Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation

Work instructions	<p>may come from:</p> <ul style="list-style-type: none"> • briefings, handovers, plans and work orders and may be written or verbal, formal or informal and may include: <ul style="list-style-type: none"> ➤ nature and scope of tasks ➤ specifications ➤ quality of finished works ➤ achievement targets ➤ operational conditions ➤ obtaining of 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 ➤ contamination control requirements ➤ environmental control requirements ➤ barricade and signage requirements
Hazards	<p>may include:</p> <ul style="list-style-type: none"> • release of gases from formation or samples obtained • spread of contaminants as a result of drilling or cleaning processes • change in the chemistry of contaminants as a result of drilling and recovery of the samples • working in proximity to drilling rig • use of high pressure air for drilling operations • entanglement in rotating pipes • string makeup and breakout hazards • drilling equipment and down-hole tools will depend on the air drilling method being used
Coordination requirements	<p>may include</p> <ul style="list-style-type: none"> • drill team members • other equipment operators • maintenance personnel • supervisors • worksite personnel
Chemical	<p>includes:</p> <ul style="list-style-type: none"> • fluid loss control agents • dispersants • surfactants • weighing agents (barium sulphate or salts) • pH control agents • gypsum based setting agents • other cement grout additives for quick setting • agents for treating cement contamination • flocculation products • potassium chloride • lost circulation materials (granular polymers, cottonseed

	<p>hulls, mica flakes, shredded organic fiber, micro-cells and short polysynthetic rope fibers)</p> <ul style="list-style-type: none"> • A&B foam (for sealing collars) • chlorination products
Drill fluids	<p>may include:</p> <ul style="list-style-type: none"> • water • viscosifying polymer muds with or without use of sodium bentonite • blended polymer muds • API bentonite muds • high yielding bentonites muds • organic polymer muds • polyanionic cellulosic polymer muds • modified natural polymer muds • liquid anionic polymer muds
Equipment	<p>includes:</p> <ul style="list-style-type: none"> • rig, water trucks, service trucks, air compressor • hand tools such as breakout tongs and still sons • collars • stabilisers • drill pipe • casing • drill bits such as drag, tricone, tungsten carbide, hammers, strata, diamond, reamers
Operational problems	<p>may include:</p> <ul style="list-style-type: none"> • circulation loss zones • machine breakdowns • equipment failure • drill bit failure/breakage • deterioration in the mud condition

Evidence Guide

Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • the requirements, procedures and instructions for the conducting of mud rotary drilling • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of mud rotary drilling tasks • working with others to undertake and complete mud rotary drilling tasks that meet all of the required outcomes • consistent timely completion of the conducting of mud rotary drilling that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • rotary drilling safety requirements and procedures • personal protection requirements • First Aid requirements and procedures • good housekeeping requirements and procedures • types of mud and water delivery pumps and their

	<p>applications</p> <ul style="list-style-type: none"> • methods for the calculation of lag time for discrete formation samples • basic geology • safe work procedures for pump unit repairs, maintenance and servicing
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures for conducting of mud rotary drilling • perform routine checks and basic maintenance of mud and water delivery pumps • apply mechanical hand skills • apply mud mixing and conditioning skills • apply plant operational skills • respond to changes in ground conditions • apply sample identification and sampling skills • apply hazardous substances handling requirements and procedures • apply people skills for dealing with clients, co-workers and management • apply recording and reporting skills • interpret Material Safety Data Sheets (MSDS) • apply heavy vehicle driving skills in all conditions
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and Equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competency may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Mineral Exploration and Development Drilling Level III	
Unit Title	Conduct Wire Line Core Drilling
Unit Code	MIN EDD3 04 0114
Unit Descriptor	<p>This unit covers the conducting of wire line core drilling in resources and infrastructure industries. It includes planning and preparing for conducting of wire line core drilling; operating a core drill, drill fluid system and wire line; maintaining equipment; using hole survey and core orientation equipment; taking core samples; and responding to problems.</p> <p>Core drilling may also be called diamond core drilling, diamond drilling or coring. It is used for environmental, geotechnical and mineral exploration drilling. This unit is appropriate for those working in a driller role, at worksites within: Civil construction, Coal mining, Drilling, Extractive industries, Metalliferous mining</p>

Elements	Performance Criteria
1. Plan and prepare for conducting of wire line core drilling	<p>1.1. Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2. Work instructions are obtained, confirmed and applied for the allocated task.</p> <p>1.3. All potential hazards are identified, managed and reported.</p> <p>1.4. Coordination requirements are resolved with others at the site prior to commencing and during work activities.</p>
2. Operate a core drill efficiently to achieve targets	<p>2.1. Different drill rod and casing types, thread forms and thread make up parameters are identified and used.</p> <p>2.2. Appropriate drill bits and reamer shells are selected.</p> <p>2.3. Inner tube length is adjusted to ensure appropriate fluid flow around the core.</p> <p>2.4. Rod and casing handling equipment is used safely.</p> <p>2.5. Drill rods/pipes and down hole equipment are added/broken out and removed.</p> <p>2.6. Appropriate rotation speed, weight on the bit, drilling fluid flow rate and penetration rate applicable to the ground conditions are applied.</p> <p>2.7. Drill string components are measured and depth of hole is calculated.</p> <p>2.8. Holes are collared.</p> <p>2.9. Casing is installed.</p>
3. Operate drill fluid system	<p>3.1. Hole conditions requiring the use of drilling fluids and chemicals are identified.</p> <p>3.2. Suitable fluids and additives are selected, prepared, applied, tested and monitored.</p>

	<p>3.3. Fluid return and solids content are monitored and control measures implemented.</p> <p>3.4. Fluid and cuttings specific gravity and up hole velocity are monitored to ensure efficient hole clearing.</p> <p>3.5. Causes of pressure are monitored in fluid systems.</p> <p>3.6. The appropriate fluid pumping rate is selected for the hole size.</p>
4. Operate wire line	<p>4.1. Hazards associated with the use of wire line systems are controlled.</p> <p>4.2. Overshot retrieval is uses and release system dried.</p> <p>4.3. Wire line overshot is assembled and maintained.</p> <p>4.4. Pump is used in and dry hole lowering devices.</p>
5. Maintain equipment	<p>5.1. The required personal protective equipment is used and safe working procedures are followed when using grinders.</p> <p>5.2. Impregnated bits are striped according to manufacturer/company procedures.</p> <p>5.3. Backend assembly is dismantled and serviced.</p> <p>5.4. Core barrels, service and replace worn/damaged components are dismantled.</p> <p>5.5. Wire line retrieval components service is dismantled and worn/damaged components are replaced if required.</p> <p>5.6. Drill string is maintained.</p> <p>5.7. Bit management is maintained, required information recorded and bits are stored correctly.</p>
6. Use hole survey and core orientation equipment	<p>6.1. Survey tool is used, as required.</p> <p>6.2. Survey and core orientation devices are assembled and maintained.</p> <p>6.3. Survey data is read and recorded.</p> <p>6.4. Core orientation devices are operated as required.</p>
7. Take core samples	<p>7.1. Control measures are implemented for minimizing core loss.</p> <p>7.2. Core blockages affecting sample quality are identified.</p>
8. Respond to problems	<p>8.1. Possible problems are identified in equipment or process.</p> <p>8.2. Problems needing action are determined.</p> <p>8.3. Possible fault causes are determined.</p> <p>8.4. Problem is rectified using appropriate solution within area of responsibility.</p> <p>8.5. Follow through items initiated until final resolution has occurred.</p> <p>8.6. Problems outside area of responsibility are reported to designated person.</p>

Variable	Range
Relevant compliance documentation	may include: <ul style="list-style-type: none"> • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Relevant Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Work instructions	may come from: <ul style="list-style-type: none"> • briefings, handovers, plans and work orders and may be written or verbal, formal or informal and may include: <ul style="list-style-type: none"> ➢ nature and scope of tasks ➢ specifications ➢ quality of finished works ➢ achievement targets ➢ operational conditions ➢ obtaining of 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 ➢ contamination control requirements ➢ environmental control requirements ➢ barricade and signage requirements
Hazards	may include: <ul style="list-style-type: none"> • snags in wire rope • incorrect spooling of wire • wire line 'throwing a loop' • incorrect speed of operation • wire line overrun • inadequate maintenance • inner tube drop off
Coordination requirements	may include working with: <ul style="list-style-type: none"> • members of the drill team • other equipment operators • maintenance personnel • supervisors • mine personnel
Drill rods and casing	may include: <ul style="list-style-type: none"> • wire line drill rods • casing may be steel or PVC
Drill bits	may include: <ul style="list-style-type: none"> • blade bits • tricone bits • PCD bits

	<ul style="list-style-type: none"> • surface set diamond core bits and reamer shells • impregnated diamond core bits and reamer shells • non-core diamond bits • Retractable Bit system 		
Rod and casing handling equipment	<p>may include:</p> <ul style="list-style-type: none"> • manual handling • hoist plug • mechanized rod handlers • foot operated rod safety clamp • hydraulic rod/casing clamps • hydraulic rod/casing spinner • hook and clamshell 		
Collar attachments for underground drilling	<p>may include:</p> <ul style="list-style-type: none"> • stuffing boxes • fluid control valves • T pieces • gas control equipment 		
Drilling fluids	<p>may include:</p> <ul style="list-style-type: none"> • drilling mud and additives: <ul style="list-style-type: none"> ➢ polymers ➢ soluble oils ➢ fluid loss additives ➢ water ➢ salt • cement and cement additives: <ul style="list-style-type: none"> two part urethane foam sealants - urethane foam, cement, gypsum 		
Personal protective equipment	<p>includes:</p> <ul style="list-style-type: none"> • steel-capped boots and hardhat • gloves • dust mask • eye and hearing protection • general protective and reflective clothing 		
Core barrels	<p>may include:</p> <ul style="list-style-type: none"> • double tube wire line core barrels • triple tube wire line core barrels • starter barrels • chrome barrels 		
Survey and core orientation devices	<p>may include:</p> <ul style="list-style-type: none"> • single shot survey camera - mechanical/electronic • multi shot survey camera - electronic/mechanical • digital survey devices • spear type core orientation device • ball type core orientation device • pin type orientation devices • electronic orientation devices 		
Samples	<p>may include those:</p> <ul style="list-style-type: none"> • collected from sludge • core samples 		
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Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • the requirements, procedures and instructions for conducting wire line core drilling • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of wire line core drilling • working with others to undertake and complete wire line core drilling tasks that meet all of the required outcomes • consistent timely completion of the wire line core drilling that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • configuration requirements of various thread forms and make-up torque requirements • function of hole collaring, use of casing and collar sealing techniques • methods required to produce uncontaminated samples • impregnated bit stripping procedures • bit selection for different types of drilling and different ground conditions • measurement of bits and other related components • critical dimensions of a core barrel if barrel has to be drilled through to reduce hole size • relationships between penetration rate and bit life • role that core blockages play in affecting sample quality • functions of drilling fluids and control procedures • relationship between hole diameter, rod diameter, pump output and the specific gravity of formation cutting • types of mud and water delivery pumps and their applications • hazards associated with wire line operations and control measures required • purpose of drill hole surveys and the functions of azimuth and dip readings and where it is applied • core orientation and where it is applicable
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures for conducting of wire line core drilling • apply routine checks and basic maintenance to mud and water delivery pumps • identify, mix and apply collar sealants • apply collar casing equipment attachment techniques • apply basic drilling fluid tests such as viscosity and specific gravity • apply core handling and tray placement requirements and procedures
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and Equipment, and to information on workplace practices and OHS practices.</p>

Methods of Assessment	Competence may be assessed through: <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level III	
Unit Title	Conduct Conventional Core Drilling
Unit Code	MIN EDD3 05 0114
	<p>This unit covers the conducting of conventional core drilling in resources and infrastructure industries. It includes planning and preparing for drilling, operating the drill and drill fluid system, using core orientation equipment, taking core samples, responding to problems, and maintaining equipment.</p> <p>Core drilling may also be called diamond core drilling, diamond drilling or coring. It is used for environmental, geotechnical and mineral exploration drilling. This unit is appropriate for those working in operational roles, at worksites within: Civil construction, Coal mining, Drilling, Extractive industries, and Metalliferous mining.</p>

Elements	Performance Criteria
1. Plan and prepare for conducting of wire line core drilling	<p>1.1. Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2. Work instructions are obtained, confirmed and applied for the allocated task.</p> <p>1.3. All potential hazards are identified, managed and reported.</p> <p>1.4. Coordination requirements are resolved with others at the site prior to commencing and during work activities.</p>
2. Operate a core drill efficiently to achieve targets	<p>2.1. Different drill rod and casing types, thread forms and thread make up parameters are identified and used.</p> <p>2.2. Appropriate drill bits and reamer shells are selected.</p> <p>2.3. Inner tube length is adjusted to ensure appropriate fluid flow around the core.</p> <p>2.4. Rod and casing handling equipment is used safely.</p> <p>2.5. Drill rods/pipes and down hole equipment are added/broken out and removed.</p> <p>2.6. Appropriate rotation speed, weight on the bit, drilling fluid flow rate and penetration rate applicable to the ground conditions are applied.</p> <p>2.7. Drill string components are measured and depth of hole is calculated.</p> <p>2.8. Holes are collared.</p> <p>2.9. Casing is installed.</p>
3. Operate drill fluid system	<p>3.1. Hole conditions requiring the use of drilling fluids and chemicals are identified.</p>

	<p>3.2. Suitable fluids and additives are selected, prepared, applied, tested and monitored.</p> <p>3.3. Fluid return and solids content are monitored and control measures implemented.</p> <p>3.4. Fluid and cuttings specific gravity and up hole velocity are monitored to ensure efficient hole clearing.</p> <p>3.5. Causes of pressure are monitored in fluid systems.</p> <p>3.6. The appropriate fluid pumping rate is selected for the hole size.</p>
4. Use survey and core orientation equipment	<p>4.1. Survey and core orientation devices are assembled, maintained and used.</p> <p>4.2. Survey data is read and recorded.</p> <p>4.3. Core orientation devices are operated.</p>
5. Take core samples	<p>5.1. Measures are controlled to implement for minimizing core loss.</p> <p>5.2. Core blockages affecting sample quality are identified.</p>
6. Respond to problems	<p>6.1. Possible problems are identified in equipment or process.</p> <p>6.2. Problems needing action are determined.</p> <p>6.3. Possible fault causes are determined.</p> <p>6.4. Problem is rectified using appropriate solution within area of responsibility.</p> <p>6.5. Follow through items initiated until final resolution has occurred.</p> <p>6.6. Problems outside area of responsibility are reported to designated person.</p>
7. Maintain equipment	<p>7.1. The required personal protective equipment is used and safe working procedures are followed.</p> <p>7.2. Impregnated bits are striped according to required procedures.</p> <p>7.3. Head assembly is dismantled and serviced.</p> <p>7.4. Drill string is maintained.</p> <p>7.5. Bit management is maintained, required information recorded and bits are stored correctly.</p>

Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organization and site requirements and procedures • manufacturer's guidelines and specifications • Relevant Ethiopian standards • code of practice

	<ul style="list-style-type: none"> • Employment and Workplace Relations legislation • Equal Employment Opportunity, Disability Discrimination legislation
Work instructions	<p>may come from:</p> <ul style="list-style-type: none"> • briefings, handovers, plans and work orders and may be written or verbal, formal or informal and may include: <ul style="list-style-type: none"> ➢ nature and scope of tasks ➢ specifications ➢ quality of finished works ➢ achievement targets ➢ operational conditions ➢ obtaining of 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 ➢ contamination control requirements ➢ environmental control requirements ➢ barricade and signage requirements
Hazards	<p>include:</p> <ul style="list-style-type: none"> • incorrect speed of operation • inadequate maintenance • inner tube drop off
Coordination requirements	<p>may include:</p> <ul style="list-style-type: none"> • drill team • other equipment operators • maintenance personnel • supervisors • worksite personnel
Drill rods	<p>may include:</p> <ul style="list-style-type: none"> • conventional or wire line drill rods • casing - steel, PVC
Drill bits	<p>may include:</p> <ul style="list-style-type: none"> • blade bits • tricone bits • PCD bits • surface set diamond core bits and reamer shells • impregnated diamond core bits and reamer shells • non-core diamond bits
Fluids	<p>may include:</p> <ul style="list-style-type: none"> • drilling mud and additives: <ul style="list-style-type: none"> ➢ polymers ➢ soluble oils ➢ fluid loss additives ➢ water ➢ salt

	<ul style="list-style-type: none"> • cement and cement additives • two part urethane foam • sealants - urethane foam, cement, gypsum
Core barrels	<p>may include:</p> <ul style="list-style-type: none"> • conventional single tube core barrels • conventional double tube core barrels • conventional triple tube core barrels • starter barrels • chrome barrels
Rod and casing handling equipment	<p>may include:</p> <ul style="list-style-type: none"> • manual handling • hoist plug • mechanized rod handlers • foot operated rod safety clamp • hydraulic rod/casing clamps • hydraulic rod/casing spinner • hook and clamshell
Collar attachments	<p>may include:</p> <ul style="list-style-type: none"> • stuffing boxes • fluid control valves • T pieces • gas control equipment
Survey and core orientation devices	<p>may include:</p> <ul style="list-style-type: none"> • single shot survey camera - mechanical/electronic • multi shot survey camera - electronic/mechanical • digital survey devices • spear type core orientation device • ball type core orientation device • pin type orientation devices • electronic orientation devices
Samples	<p>may include:</p> <ul style="list-style-type: none"> • sampling from mud rotary • collection of sludge • core samples
Personal protective equipment	<p>includes:</p> <ul style="list-style-type: none"> • steel-capped boots and hardhat • gloves • dust mask • eye and hearing protection • general protective and reflective clothing

Evidence Guide

Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • the requirements, procedures and instructions for conducting conventional core drilling • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of conventional core drilling tasks • working with others to undertake and complete the 		
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	<p>conventional core drilling tasks that meets all of the required outcomes</p> <ul style="list-style-type: none"> • consistent timely completion of conventional core drilling tasks that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • configuration of various thread forms and make up torque requirements • the function of hole collaring, use of casing and collar sealing techniques • methods required to produce uncontaminated samples • impregnated bit stripping procedures • bit selection for different types of drilling and different ground conditions • the relationships between penetration rate and bit life • the role that core blockages play in affecting sample quality • the functions of drilling fluids and control procedures • relationship between hole diameter, rod diameter, pump output and the specific gravity of formation cutting • types of mud and water delivery pumps and their applications • the purpose of drill hole surveys and the functions of azimuth and dip readings • purpose and principles of core orientation
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures • apply routine checks and basic maintenance procedures for mud and water delivery pumps • identify, mix and apply of collar sealants • apply procedures for attachment of required equipment to collar casing • apply basic drilling fluid tests such as viscosity and specific gravity • apply procedures to ensure that core is handled correctly and placed in core trays as required • apply techniques for measuring bits and other related components
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and Equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competency may be assessed in the work place or in a simulated work place setting</p>

Occupational Standard: Mineral Exploration and Development Drilling Level III	
Unit Title	Conduct Air Drilling
Unit Code	MIN EDD3 06 0114
Unit Descriptor	<p>This unit covers the conduct of air drilling in resources and infrastructure industries. It includes planning and preparing for conduct of air drilling; inspecting and maintaining air drilling equipment; drilling; selecting and using drilling additives; taking samples; maintaining equipment; and responding to problems.</p> <p>Air drilling is used for environmental, geotechnical, mineral exploration, mineral production, blast hole, seismic and water well drilling. Air drilling methods may include: rotary air blast, air core, down the hole hammer, open hole, reverse circulation or combinations of the above. This unit is appropriate for those working in driller roles, at worksites within: Civil construction, Coal mining, Drilling, Extractive industries, and Metalliferous mining.</p>

Elements	Performance Criteria
1. Plan and prepare to conduct air drilling	<p>1.1. Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2. Work instructions are obtained, confirmed and applied for the allocated task.</p> <p>1.3. All potential hazards are identified, managed and reported.</p> <p>1.4. Coordination requirements are resolved with others at the site prior to commencing and during work activities.</p>
2. Inspect and maintain air drilling equipment	<p>2.1. Ensure restraining devices are not damaged or worn and are correctly fitted.</p> <p>2.2. Restraining devices are fitted or replaced in accordance with procedures.</p> <p>2.3. The cyclone is inspected and maintained in safe and serviceable condition.</p> <p>2.4. Ensure mounting and security of cyclone is made adequate for safe operation, particularly when down hole water may result in release of energy.</p> <p>2.5. Dust suppression systems are maintained to ensure minimal emission of airborne dust and integrity of sample quality.</p> <p>2.6. Pressure relief valves are inspected to ensure they have not been tampered with.</p>
3. Drill using air drilling methods	<p>3.1. Appropriate drill rod and drill string components given hole specification and anticipated ground conditions are selected and used.</p>

	<p>3.2. Make-up and break-out equipment is operated.</p> <p>3.3. Appropriate type and size of in-hole tools given hole specification and anticipated ground conditions are selected and used.</p> <p>3.4. Hole collar is drilled/opened-up as required to suit given ground conditions and hole specification.</p> <p>3.5. Drill hole collar casing is installed and sealed at the hole collar.</p> <p>3.6. Outside hole return collar device is installed, if required, hole specification of open or reverse circulation drill hole given.</p> <p>3.7. The safe operation of drill rod and pipe handling equipment is operated and/or supervised.</p> <p>3.8. Drill rods or casing and other in-hole equipment are added and removed.</p> <p>3.9. Air pressure and other drilling parameters are monitored and adjusted to achieve maximum performance.</p> <p>3.10. Down hole water conditions are monitored and controlled to ensure integrity of the hole, drill cuttings and sample quality.</p> <p>3.11. Discharge is monitored and safely controlled from outside hole return collar device as required.</p> <p>3.12. Depth of hole is calculates.</p>
<p>4. Select and use drilling additives</p>	<p>4.1. Ground conditions requiring the use of drilling additives are identified.</p> <p>4.2. Appropriate drilling additives are selected to suit ground conditions.</p> <p>4.3. The preparation of required drilling additives is prepared and/or supervised.</p> <p>4.4. Drilling additives are used to achieve required results.</p>
<p>5. Take samples</p>	<p>5.1. Sample devices are selected and checked to ensure client sample quantity and quality specifications are met.</p> <p>5.2. The cleaning of sample devices is cleaned or supervised.</p> <p>5.3. Splitting, bagging, presentation, and marking of samples are monitored to ensure client specifications are met.</p> <p>5.4. Sample blockages affecting or having the potential to affect sample quality are identified and promptly rectified.</p> <p>5.5. Sample delivery hose blockages are cleared safely.</p> <p>5.6. Outside return hole blockages of collared holes are cleared as required.</p> <p>5.7. Drill crew is supervised to ensure all sampling tasks are</p>

	carried out correctly and safely.
6. Maintain equipment	<p>6.1. The use of specified personal protective equipment is supervised when using grinders or bit sharpening equipment.</p> <p>6.2. The selection and correct fitting grinding disks, wheels and stones are supervised in accordance with site specifications.</p> <p>6.3. Wear of in-hole tools is monitored.</p> <p>6.4. Compressed air hoses and hose fittings or clamps are checked, maintained, and/or replaced.</p> <p>6.5. The correct sharpening and maintenance of in-hole tools are supervised.</p> <p>6.6. Worn or damaged components and reassemble in-hole equipment are inspected, dismantled, replaced.</p>
7. Respond to problems	<p>7.1. Drill cuttings or sample quality, quantity and air return are monitored.</p> <p>7.2. Possible problems in equipment or process are identified.</p> <p>7.3. Possible cause(s) of problems is/are determined.</p> <p>7.4. Problem(s) is/are rectified using appropriate solution within area of responsibility.</p> <p>7.5. Follow through items initiated until final resolution has occurred.</p> <p>7.6. Problems outside area of responsibility are reported to designated person.</p>

Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organisational and site requirements and procedures • manufacturer's guidelines and specifications • Relevant Ethiopian standards • code of practice • Employment and Workplace Relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Work instructions	<p>may come from:</p> <ul style="list-style-type: none"> • briefings, handovers, plans and work orders and may be written or verbal, formal or informal and may include: <ul style="list-style-type: none"> ➤ nature and scope of tasks ➤ specifications ➤ quality of finished works ➤ achievement targets ➤ operational conditions ➤ obtaining of permits required ➤ site layout ➤ out of bounds areas ➤ worksite inspection requirements

	<ul style="list-style-type: none"> ➤ lighting conditions ➤ plant or equipment defects ➤ hazards and potential hazards ➤ coordination requirements or issues ➤ contamination control requirements ➤ environmental control requirements ➤ barricade and signage requirements
Hazards	<p>may include:</p> <ul style="list-style-type: none"> • lack of preventative maintenance causing rupture of air delivery and sample delivery hoses • damaged/worn clean air and sample hoses • inadequate airborne dust prevention control measures • high abrasive wear rates to drill cutting receival equipment • incorrect match of hose size to hose tails/clamps and fittings • incorrect fitting of clean air or sample hoses • incorrectly fitted hose restraint devices • incorrect hose restraints in use • incorrect or inadequately secured cyclones and cyclone lids • incorrectly fitted grinding wheels, stones and disks • inappropriate methods/procedures for clearing sample hose blockages • insecure sample deflection devices fitted to the drill head • incorrect fitting of wire to wire-line winch drum • wire line snags and overruns • lack of provision of restraint devices to clean air, sample hoses and drill head sample deflection devices • incorrectly fitted stuffing boxes and T pieces • excessive drill pipe and drill string component wear • unguarded or uncontrolled access to pinch points, i.e. hydraulic make-up and break-out devices • poor triangulation configuration of rod/pipe hoisting equipment for angle of hole • excessive wear to hook and clamshell assemblies • lack of provision of handling equipment for movement of sample bags and heavy up and down hole equipment • poor ergonomic equipment design for tasks such as sample splitting, bagging and movement • inappropriate storage/racking of drill pipe • incorrect use of stilsons • incorrect mixing procedure and application of urethane forms • inadequate security of outside hole collar devices • drill cuttings blockages (down and up hole)
Coordination requirements	<p>may include:</p> <ul style="list-style-type: none"> • drill team • other equipment operators • maintenance personnel • supervisors • worksite personnel

Restraining devices	shall include: <ul style="list-style-type: none"> • two leg stocking type whip checks • correctly rated shackles • correctly rated and fitted whip check anchor points
Restraining devices	may also include: <ul style="list-style-type: none"> • wire rope sling type whip checks • internal hose wire type whip checks • hose restraint brackets and clamps
Safe and serviceable condition	will be: <ul style="list-style-type: none"> • free from excessive leaks and excessive wear to internal wear resistant materials • chimney correctly positioned in the cyclone vortex zone to best eliminate dust emission
Make up and break out equipment	may include: <ul style="list-style-type: none"> • stilsons • hydraulic pipe tongs • hydraulic pipe wrenches • hydraulic pipe/rod spinners • hydraulic make/break devices • make up torque requirements • bit break out plates
In-hole	equipment may include: <ul style="list-style-type: none"> • drill rods and drill pipe including: <ul style="list-style-type: none"> ➢ air core rods with inner-tubes (may use IF or API threads) ➢ conventional drill pipe (API Reg or API IF threads) ➢ reverse circulation drill pipe (e.g. Remet, Metzke, Drill star) ➢ drill pipe thread type subs, saver subs, blow up/down subs, dig-out subs and cross-overs (API and IF threads) ➢ floating/fixed inner tubes ➢ inner-tube sealing devices such as air core inner tube ferrules or RC inner-tube 'O' rings • air core trumpets and trumpet subs
Drill hole collar casing	may include: <ul style="list-style-type: none"> • steel casing • PVC casing • poly pipe (to maintain open blast hole collar)
Outside hole return collar devices	may include: <ul style="list-style-type: none"> • stuffing boxes and T pieces for conventional open hole drilling, including RAB, hammer or combined RAB hammer • stuffing boxes and T pieces for reverse circulation drilling • discharge restraint devices as required • stuffing boxes and T pieces for discharge directed to sump or cyclone
Drill rod and pipe handling equipment	may include: <ul style="list-style-type: none"> • manual handling • hook and clamshell • hoist plug • automated and semi-automated rod handlers

	<ul style="list-style-type: none"> • hydraulic pipe/rod/casing clamps • hydraulic pipe/rod/casing spinner • drill rod/pipe clamps • rod/pipe spanner • slips • slips basket
Drill bits	<p>may include:</p> <ul style="list-style-type: none"> • blade bits • PCD bits • tri-cone bits • button bits (conventional and RC) • air core bits
Drilling parameters	<p>may include:</p> <ul style="list-style-type: none"> • rotation speed • weight on bit • penetration rate
Drilling additives	<p>may include:</p> <ul style="list-style-type: none"> • drilling mud (e.g. polymers) • foams • cement and cement additives • hole collar sealants: • 2 part urethane foam, and/or • gypsum cement
Personal protective equipment	<p>includes:</p> <ul style="list-style-type: none"> • steel-capped boots and hardhat • gloves • dust mask • eye and hearing protection • general protective and reflective clothing

Evidence Guide

Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • the requirements, procedures and instructions for conducting air drilling • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of air drilling • working with others to undertake and complete air drilling tasks that meets all of the required outcomes • consistent timely completion of air drilling tasks that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • the importance to match like threads with like threads on all threaded components and make up torque requirements applicable to thread form in use • the relationship between pressure, volume, hole diameter, pipe diameter and calculation of up hole velocity • drill pipe and rod and thread form wear limit parameters • the need for correct hole collaring, use of casing and collar sealing techniques

	<ul style="list-style-type: none"> • TC bit sharpening procedures • potential problems related to inaccurate measurement and usage sequence of ground engaging consumables and related down hole components • hazard control measures to enable safe use of compressed air • the importance of monitoring sample quantity • the role that drill cuttings blockages play in affecting sample quality • safe procedures to clear down and up hole drill cuttings blockages within the outside hole return, down hole equipment and up hole sample system and/or hose • the critical need for correct fitting inspection and maintenance replacement of restraining devices • the hazards associated with the collection of high velocity drilling cuttings • the reason for checking inner tubes and inner tube sealing devices in RC drill pipe • hazards associated with wire-line operations and applicable control measures • identification of various thread forms used in air drilling • identification of various in-hole tools and correct application given ground conditions • the need for uncontaminated samples
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures • apply prescribed thread form torque parameters during make-up of down hole equipment and consumables • apply correct internal and external callipers, vernier, rule and or tape measure for identification of drill pipe/rod diameter wear limits, measurement of bits/shrouds and other down hole equipment • apply correct measurement of drill string length • apply methods for calculating hole depth
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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level III	
Unit Title	Conduct Cable Tool Drilling
Unit Code	MIN EDD3 07 0114
Unit Descriptor	This unit covers the conduct of cable tool drilling in the drilling industry. It includes planning and preparing for cable tool drilling, operating cable tool drills, operating drill fluid systems, maintaining equipment, recovering formation samples, and responding to problems.

Elements	Performance Criteria
1. Plan and prepare for cable tool drilling	<p>1.1. Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2. Work instructions are obtained, confirmed and applied for the allocated task.</p> <p>1.3. All potential hazards are identified, managed and reported.</p> <p>1.4. Coordination requirements are resolved with others at the site prior to commencing and during work activities.</p> <p>1.5. Alarm/report is raised as required according to site procedures.</p>
2. Operate cable tool drill	<p>2.1. Different tool/casing types, thread forms and thread make up parameters are identified and used.</p> <p>2.2. Appropriate bits, shoes, clamps, casing, tools and lifting devices are selected for the expected formations.</p> <p>2.3. Tool handling equipment such as spanners and chain tongs is used safely.</p> <p>2.4. Tool strings are assembled according to organization or manufacturer's procedures.</p> <p>2.5. Correct tension on the drill line and correct stroke rate are maintained during drilling operations.</p> <p>2.6. Hole of cuttings bailed as required to maintain satisfactory penetration rates.</p> <p>2.7. Hazards associated with the use of wire rope are controlled for drilling and bailing.</p> <p>2.8. Drill string components are measured and depth of hole is calculated.</p> <p>2.9. Drilling tools are selected to maintain hole straightness.</p> <p>2.10. Casing is driven and jacked as required.</p> <p>2.11. Appropriate tools are selected to undertake fishing operations.</p>

3. Operate drill fluid system	<p>3.1. Hole conditions requiring the use of drilling fluids/chemicals are identified.</p> <p>3.2. Suitable fluids and additives are selected, prepared, applied, tested and monitored.</p> <p>3.3. Fluid level in the hole is adjusted to maintain hole stability and optimize penetration rates.</p> <p>3.4. Drill fluids are disposed of in an environmentally safe manner.</p>
4. Maintain equipment	<p>4.1. Bits or remetal rope swivels are sharpened in accordance with personal protective equipment and safety requirements.</p> <p>4.2. Rope swivels are cleaned and lubricated to ensure correct operation.</p> <p>4.3. Slings, drill lines and bailing lines are checked for wear and replaced as necessary using appropriate wire rope and spooling.</p> <p>4.4. Derrick sheaves are greased regularly.</p> <p>4.5. Critical rig components such as sheaves and shackles are examined regularly for wear or cracks.</p> <p>4.6. Tool string components are maintained.</p> <p>4.7. Clutch play, drive belt and jockey pulley tension are adjusted as required.</p> <p>4.8. Routine maintenance is performed to rig engine.</p>
5. Recover formation samples	<p>5.1. Appropriate sampling tools/methods are selected depending on the type of formations being drilled.</p> <p>5.2. Formation water samples are obtained as required.</p>
6. Respond to problems	<p>6.1. Possible problems in equipment or processes are identified.</p> <p>6.2. Problems that need action are determined.</p> <p>6.3. Possible fault causes are determined.</p> <p>6.4. Problem is rectified using appropriate solution within area of responsibility.</p> <p>6.5. Follow through items initiated until final resolution has occurred.</p> <p>6.6. Problems outside area of responsibility are reported to designated person.</p>

Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organization and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards

	<ul style="list-style-type: none"> • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Work instructions	<p>may come from briefings, handovers, plans and work orders and may be written or verbal, formal or informal and may include:</p> <ul style="list-style-type: none"> • nature and scope of tasks • specifications • quality of finished works • achieved targets • operational conditions • obtaining of required permits • site layout • out of bounds areas • worksite inspection requirements • lighting conditions • plant of equipment defects • coordination requirements or issues • contamination control requirements • environmental control requirements • barricade and signage requirements
Hazards	<p>may include:</p> <ul style="list-style-type: none"> • working in proximity to drilling rig
Coordination requirements	<p>may include:</p> <ul style="list-style-type: none"> • other equipment operators • maintenance personnel • supervisors • site personnel
Tool/casing types and thread forms	<p>may include:</p> <ul style="list-style-type: none"> • AWW casing • slimline casing • API tool threads • goldfields tool threads • Southern Cross tool threads
Appropriate bits, shoes, clamps, casing, tools and lifting devices	<p>may include:</p> <ul style="list-style-type: none"> • spudding bits • undercutting bits • star bits • chisel bits • jars • drive clamps • casing lift/drive caps
Handling equipment	<p>may include:</p> <ul style="list-style-type: none"> • tool spanners • tool wrenches • slings • chain tongs • casing clamps and casing jacks

Hazards associated with the use of wire rope	<p>may include:</p> <ul style="list-style-type: none"> • snags in wire rope • incorrect spooling of wire • wire line 'throws a loop'
Tools to maintain hole straightness	<p>may include:</p> <ul style="list-style-type: none"> • drill stem stabilisers • torpedo bits
Tools to undertake fishing operations	<p>may include:</p> <ul style="list-style-type: none"> • friction sockets • over shots • lead impression tools • wall hooks • casing spears • rope spears • rope cutter • latch jacks • fishing jars
Drilling fluids and additives	<p>may include:</p> <ul style="list-style-type: none"> • water • API bentonite • native clays • various polymers • barite (barium sulfate) • dispersants • loss circulation products
Personal protective equipment	<p>may include:</p> <ul style="list-style-type: none"> • welding mask/goggles • welding gloves • ear protection • eye protection • safety boots • hard hat and sunscreen
Tool string components	<p>may include:</p> <ul style="list-style-type: none"> • swivel socket and mandrel • cable tool joints • cutting edges on bits • drilling jars • bailers
Sampling tools/methods	<p>may include:</p> <ul style="list-style-type: none"> • sampling by bailer • sand barrel • clay barrel • chop pump and earth socket

Evidence Guide

Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • the requirements, procedures and instructions for conducting cable tool drilling
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	<ul style="list-style-type: none"> • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of cable tool drilling • working with others to undertake and complete the conduct of cable tool drilling that meets all of the required outcomes • consistent timely completion of cable tool drilling that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: <ul style="list-style-type: none"> • welding to dress bits, casing shoes • remetalling rope sockets
Underpinning Skills	Demonstrate skills to: <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures for conducting cable tool drilling • welding • oxy-acetylene use
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: <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level III	
Unit Title	Conduct Top/Down-Hole Hammer Drilling
Unit Code	MIN EDD3 08 0114
Unit Descriptor	This unit covers the conduct of top/down-hole hammer drilling and blast hole drilling in the drilling industry. It includes planning and preparing for top/down-hole hammer drilling, operating top/down-hole hammer drilling, using drilling fluids, maintaining equipment, and responding to problems.

Elements	Performance Criteria
1. Plan and prepare for top/down-hole hammer drilling	<p>1.1 Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2. Work instructions are obtained, confirmed and applied for the allocated task.</p> <p>1.3. All potential hazards are identified, managed and reported.</p> <p>1.4. Coordination requirements are resolved with others at the site prior to commencing and during work activities.</p> <p>1.5 Tools and equipment are selected to carry out tasks consistent with driller's duties and the requirements of the job, check for serviceability and rectify or report any faults.</p> <p>1.6 Restraining devices are checked on all pressure hoses.</p> <p>1.7 Restraining devices on pressure hoses are fitted/replaced as required.</p> <p>1.8 Alarm/report is raised as required.</p>
2. Operate top/down hole hammer drill	<p>2.1 Appropriate rod type, thread form and drill string components are selected for job.</p> <p>2.2 Appropriate bit is measured and selected for the job.</p> <p>2.3 Hole is collared.</p> <p>2.4 Rod handling equipment is used safely and correctly.</p> <p>2.5 Drill rods/pipes and down hole equipment are added/broken out and removed.</p> <p>2.6 Drill is weighted/fed/rotated at right rate for optimum penetration.</p> <p>2.7. Impact pressure and rate are adjusted to match ground conditions.</p> <p>2.8 Air pressure is adjusted to achieve required hole clearance.</p> <p>2.9 Line string is measured and depth of hole calculated.</p>
3. Use drilling fluids	<p>3.1 Hole conditions requiring the use of dust control fluids are identified.</p>

	<p>3.2 Suitable ingredients/fluids are selected.</p> <p>3.3 The preparation of required fluids is prepare/monitored.</p> <p>3.4 Dust control fluids are used to achieve required result.</p>
4. Maintain equipment	<p>4.1 Wear is monitored.</p> <p>4.2 All equipment and hoses are checked.</p> <p>4.3 Down hole hammers are disassembled, inspected and reassembled.</p> <p>4.4 Damaged/worn parts are replaced/adjusted and reported as required.</p> <p>4.5 Bit sharpening is undertaken as required.</p> <p>4.6. Drifter is greased as required.</p>
5. Respond to problems	<p>5.1 Operation and chips/sample/air return is monitored.</p> <p>5.2 Possible problems are identified in equipment or process.</p> <p>5.3 Blockages are cleared.</p> <p>5.4 Other problems and maintenance tasks needing action are determined.</p> <p>5.5 Possible fault causes are determined.</p> <p>5.6 Problem is rectified using appropriate solution within area of responsibility.</p> <p>5.7 Follow through items initiated until final resolution has occurred.</p> <p>5.8 Problems outside area of responsibility are reported to designated person.</p>

Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organisational and site requirements and procedures • manufacturer's guidelines and specifications • Relevant Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Work instructions	<p>may come from briefings, handovers, plans and work orders and may be written or verbal, formal or informal and may include:</p> <ul style="list-style-type: none"> • nature and scope of tasks • specifications • quality of finished works • achieved targets • operational conditions • obtaining of required permits

	<ul style="list-style-type: none"> • site layout • out of bounds areas • worksite inspection requirements • lighting conditions • plant of equipment defects • coordination requirements or issues • contamination control requirements • environmental control requirements • barricade and signage requirements
Hazards	<p>may include:</p> <ul style="list-style-type: none"> • working in proximity to drilling rig • injuries to fingers, hands and back • incorrect speed of operation • inadequate maintenance • heat, dust, fatigue, dehydration • high pressure air discharge • leakage of couplings • flailing components • flailing couplings • fire • rock fall • void ground
Coordination requirements	<p>may include:</p> <ul style="list-style-type: none"> • other equipment operators • maintenance personnel • supervisors • site personnel
Tools and equipment	<p>may include:</p> <ul style="list-style-type: none"> • drill rods and drill pipe including: <ul style="list-style-type: none"> • conventional drill pipe • API threads • BECO threads • thread protectors • drill bits including: <ul style="list-style-type: none"> • DTH hammer concave, convex and flat face bits • rod handling equipment: <ul style="list-style-type: none"> • manual handling • mechanized rod handlers • hydraulic pipe/rod/clamps • hydraulic pipe/rod/spinner • make and break: <ul style="list-style-type: none"> ➤ still sons ➤ hydraulic tongs ➤ pipe wrenches ➤ pipe/rod spinners ➤ hydraulic make/break devices ➤ make up torque requirements ➤ bit break out plates

Driller's duties	<p>may include:</p> <ul style="list-style-type: none"> • using correct rod to hole diameters • selecting best bit configuration for ground and hole conditions • maintaining correct rotation speed and weight on bit for optimum penetration • calculating line string and hole depth • using correct combination of air volume and pressure to suit drilling conditions • monitoring collection, splitting and bagging of samples • ensuring all equipment is kept clean and stored correctly • ensuring principles of good housekeeping are followed • measuring bit diameters
Restraining devices	<p>may include:</p> <ul style="list-style-type: none"> • internal/external whip checks • full 'sock' whip checks • anchor points • hose fittings
Fluids	<p>may include:</p> <ul style="list-style-type: none"> • dust control additives • water
Sample and sampling tasks	<p>may include:</p> <ul style="list-style-type: none"> • air core samples • DTH samples
Maintenance tasks	<p>may include:</p> <ul style="list-style-type: none"> • sharpening button bits, cross bits • using grinders, bit sharpening machines • line string components (e.g. drill rods, subs, stabilisers, couplings, air swivels) • drill bits

Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • the requirements, procedures and instructions for down-hole hammer drilling • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of down-hole hammer drilling • working with others to undertake and complete the conduct of down-hole hammer drilling that meets all of the required outcomes • consistent timely completion of down-hole hammer drilling that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • critical need to match like threads with like threads on all tubular components and make up torque requirements • parameters relating to wear of drill pipe and integrity of threads

	<ul style="list-style-type: none"> • function of hole collaring • methods required to limit the contamination of samples • theory behind TC bit sharpening • bit selection for different types of drilling and different ground conditions • problems related to inaccurate measurement of bits and other related components • importance of monitoring sample quantity • role that blockages play in affecting sample quality • methods commonly used to clear down hole blockages in air drilled holes and the hazards associated with clearing blockages • methods used to clear a blockage in a sample delivery hose and the hazards associated with clearing blockages • critical need for restraining devices to be fitted to all pressure delivery hoses and sample delivery hoses, the devices available and their methods of attachment • dangers of drilled samples being returned to the surface at high velocity in air drilling operations and the parameters involved • importance of checking gauges and monitoring pressures, flow rates and temperatures 		
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures for conducting down-hole hammer drilling • identify various thread types on the equipment at site and the application of prescribed torque • identify worn drill pipe and damaged threads • identify and measure various bits in use • correctly use the various rod/pipe handling equipment on site • correctly and competently add/remove rods/pipe from the string • correctly apply rotation speed and weight on the bit to maintain optimum performance • correctly measure line string components and calculate hole depth • utilise the correct combination of air volume and pressure to maintain productivity and sample integrity • collar holes • ensure that samples are correctly collected and handled • ensure that all string components are correctly maintained • correctly measure bits and related components to ensure compatibility • ensure that bit sharpening equipment, used to sharpen TC bits are used correctly and safely and that bits are sharpened to correct tolerances • correctly select various bit types for differing ground conditions • disassemble describing the function of components, inspect 		
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	<p>components, replace unserviceable parts and reassemble a DTH hammer</p> <ul style="list-style-type: none"> • use prescribed techniques to safely clear sample delivery hose blockages • monitor sample quality and correctly interpret changes • accept responsibility for the correct installation and maintenance of restraining devices to pressure and sample delivery hoses • communicate the hazards of cuttings in the return air stream to all crew members • ensure that drill pipe is inspected regularly and wear rates monitored • ensure that threads are inspected and maintained as required
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: <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level III	
Unit Title	Conduct Continuous Flight Auger Drilling
Unit Code	MIN EDD3 09 0114
Unit Descriptor	<p>This unit covers the conduct of continuous flight auger drilling in resources and infrastructure industries. It includes planning and preparing for conducting continuous flight auger drilling; operating continuous flight auger drills; maintaining equipment; and respond to problems.</p> <p>Flight auger drilling is used in environmental, foundation, geotechnical, minerals exploration, seismic and water well drilling. This unit is appropriate for those working in driller roles, at worksites within: Civil construction, Coal mining, Drilling, Extractive industries, and Metalliferous mining</p>

Elements	Performance Criteria
1. Plan and prepare for conducting continuous flight auger drilling	<p>1.1. Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2. Work instructions are obtained, confirmed and applied for the allocated task.</p> <p>1.3. All potential hazards are identified, managed and reported.</p> <p>1.4. Coordination requirements are resolved with others at the site prior to commencing and during work activities.</p> <p>1.5. Steps are taken to protect the environment and record any environmental incidents.</p>
2. Operate continuous flight auger drill	<p>2.1. Borehole and start hole are collared, hole alignment is maintained, corrective action take for deflections.</p> <p>2.2. Appropriate drill string is made up.</p> <p>2.3. Additional augers, inserting them in the drill string area handled.</p> <p>2.4. Rotation, feed and holdback are applied so that flights are substantially full for the soil being drilled at any given depth.</p> <p>2.5. Flow from the flights and other factors are interpreted to determine conditions at the bit.</p> <p>2.6. Description of the soils being excavated is described and logged, or recorded.</p> <p>2.7. Auger string is made, broken and head connections are driven safely.</p> <p>2.8. Associated sampling equipment is deployed and recovered, samples, bag, label and record samples are obtained.</p> <p>2.9. A clear hole and bottom are maintained and tools deployed for cleaning hole bottom at completed depth and/or prior to sampling tool deployment.</p>

	<p>2.10. Actual depth is interpreted and/or calculated at any point during drilling, depth of strata changes interpreted and fill depth in any bore identified.</p> <p>2.11. Appropriate strategies are selected for recovery of dropped augers.</p> <p>2.12. Drill string is recovered using winch and/or head/kelly and drill string disassembled.</p> <p>2.13. Bits are selected for formation being drilled.</p> <p>2.14. Appropriate augering method is selected for situation.</p> <p>2.15. Spoil removal is maintained from hole collar with appropriate safety protocols and constantly maintained safe working conditions.</p> <p>2.16. Bores are abandoned, covered and/or secured to ensure safety of others and crew.</p> <p>2.17. Communication is done effectively with crew, clients and management.</p> <p>2.18. Paperwork is prepared and submitted for daily activities including bore logs where appropriate</p> <p>2.19. Appropriate personal protective equipment is ensured and work clothing is worn for the task.</p>
3. Maintain equipment	<p>3.1. External wear in drill string is monitored and string elements are rotated to ensure even wear.</p> <p>3.2. Drill bits and/or drill bit elements are interchanged to maintain free cutting ability.</p> <p>3.3. All string and equipment elements are checked for wear and proper function.</p> <p>3.4. Worn elements are replaced in string, bits and equipment and 'out of specification' equipment is recycled for repair or redundancy.</p> <p>3.5. Lubrication is applied as appropriate.</p> <p>3.6. Good housekeeping is maintained on site and for equipment in storage.</p> <p>3.7. Auger equipment is kept clean.</p>
4. Respond to problems	<p>4.1. Possible operational problems in equipment or process are identified.</p> <p>4.2. Symptoms of problems needing remedial action are identified.</p> <p>4.3. Possible fault causes are determined.</p> <p>4.4. Problem is rectified using appropriate solution within area of responsibility.</p> <p>4.5. Follow through items initiated until final resolution has</p>

	<p>occurred.</p> <p>4.6. Problems outside area of responsibility are reported to designated person.</p>
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Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Relevant Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Work instructions	<p>may come from:</p> <ul style="list-style-type: none"> • briefings, handovers, plans and work orders and may be written or verbal, formal or informal and may include: <ul style="list-style-type: none"> ➤ nature and scope of tasks ➤ specifications ➤ quality of finished works ➤ achievement targets ➤ operational conditions ➤ obtaining of 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 ➤ contamination control requirements ➤ environmental control requirements ➤ barricade and signage requirements
Hazards	<p>may include:</p> <ul style="list-style-type: none"> • release of gases from formation or samples obtained • spread of contaminants as a result of drilling or cleaning processes • change in the chemistry of contaminants as a result of drilling and recovery of the samples • working in proximity to drilling rig • use of high pressure air for drilling operations • entanglement in rotating pipes • string makeup and breakout hazards • drilling equipment and down-hole tools will depend on the air drilling method being used
Coordination requirements	<p>may include</p> <ul style="list-style-type: none"> • drill team • other equipment operators • maintenance personnel

	<ul style="list-style-type: none"> • supervisors • worksite personnel
Personal protective equipment	<p>includes:</p> <ul style="list-style-type: none"> • steel-capped boots and hardhat • gloves • dust mask • eye and hearing protection • general protective and reflective clothing
Equipment	<p>includes:</p> <ul style="list-style-type: none"> • solid flight augers including hex coupled augers, hex pins, D clips, screw taper thread (jet augers) and thread lube • hollow flight augers including overshot deployment of sampling tools, various manufacturer's tooling, taper screw threads and dog coupled reversible hollow augers, older hollow auger systems using parallel wall threads and plug bits deployed on inner rods • sampling systems including SPT hammers and split spoons • auger recovery tools, auger retaining plate, lifting sockets and hoisting plugs • O rings and flush hole plug spares for dog couples reversible hollow augers, circlip pliers
Operational problems	<p>may include:</p> <ul style="list-style-type: none"> • straighten holes and starting straight holes • encountering excessive water • sand blowback with hollow augers in wet unconsolidated formations • cork screwing effect when hold back not set properly • rotating too fast so that flights are not properly filled • cross contamination of samples when using solid flight augers • balancing bit cutting action with hole clearing action • recovering samples in wet conditions • OHS issues relating to rotating plant including catching long hair, loose clothing, finger injuries, safety with lifting and carrying

Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions for conducting of continuous flight auger drilling • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of continuous flight auger drilling • working with others to undertake and complete the continuous flight auger drilling tasks that meets all of the required outcomes • consistent timely completion of continuous flight auger drilling tasks that safely, effectively and efficiently meets the required outcomes

Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • OHS responsibilities • site hazards identification, assessment and control measures requirements and procedures • environmental protection measures and aspects • equipment and spares identification and characteristics • equipment technical capabilities, system limitations, gauge readings and their interpretation • soil sampling techniques, deployment methods and record keeping • operational maintenance procedures for rig and equipment including pre-start checks • basic geological formations likely to be encountered and their properties • use of water, mud and foam injection for jet auger drilling
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures for conducting of continuous flight auger drilling • apply occupational health and safety requirement and procedures • interpret geological maps, bore logs, diagrams, plans and instructions used for recording and prediction • apply procedure to operate the rig carrier to position and move between holes • apply rig stabilisation and levelling procedures • identify components in various auger techniques and sizes • apply equipment assembly, inspection and servicing procedures • apply rig operating functions and controls with safety • apply grout mixing techniques and placement methods • apply test hole grouting and abandonment requirements and procedures • apply water levels recording requirements • use a calculator to calculate hole volume • apply mechanical and manual handling safety procedures • apply pressure cleaning devices procedures to decontaminate augers and equipment • apply 'wire line' deployment and recovery techniques for sampling equipment • apply, record and report on standard penetration test method • apply deployment and recovery procedures of drilling and sampling systems using hollow augers as casing and recovery techniques for hollow auger inner rods and plug bits • use tape measures • apply conversion between metric and imperial units • calculate using addition, subtraction, multiplication and division

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: <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level III	
Unit Title	Operate Mud Systems
Unit Code	<u>MIN EDD3 10 0114</u>
Unit Descriptor	<p>This unit covers the operating of mud systems involve the drilling industry. It includes planning and preparing for operations; operating mud system; operating mud pits; operating, maintaining and repairing mud conditioning equipment; monitoring mud; operating and servicing transfer (butterfly) valves in mud pits; and recognising warning signs of kicks.</p> <p>This unit is appropriate for those working in offshore derrickman roles or as 'mud specialists' working on larger, more complex operations, at worksites within: Drilling.</p>

Elements	Performance Criteria
1. Plan and prepare for operations	<p>1.1. Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2. Work instructions are obtained, confirmed and applied for the allocated task.</p> <p>1.3. All potential hazards are identified, managed and reported.</p> <p>1.4. Coordination requirements are resolved with others at the site prior to commencing and during work activities.</p> <p>1.5. Availability and status of necessary permits are confirmed to work in accordance with requirements.</p> <p>1.6. Availability of necessary third party utilities is confirmed in accordance with requirements.</p>
2. Operate mud system	<p>2.1 Compliance with good oilfield practice and company policy is ensured when operating equipment.</p> <p>2.2 Valves in pits are aligned to ensure correct pit usage as directed.</p> <p>2.3 Safety the highest priority is given during the operation and entry of mud pits.</p> <p>2.4 Check plugs are doubled for operation.</p> <p>2.5 Tanks are sealed or secured to prevent accidental entry.</p> <p>2.6 High and low alarms are set where applicable.</p> <p>2.7 Mud pit room ventilation system is operated as required.</p> <p>2.8 Hoppers are operated in accordance with procedures.</p> <p>2.9 Dust extraction system is operated during mixing, if applicable.</p> <p>2.10 Safety showers and eye washes are checked to be accessible and operational.</p>

	<p>2.11 Forklifts operations are supervised.</p> <p>2.12 Chemicals are stored in appropriate storage area.</p> <p>2.13 Materials Safety Data Sheet (MSDS) is read, interpreted and placed in an accessible place.</p>
3. Operate, maintain and repair mud conditioning equipment	<p>3.1. Appropriate equipment is engaged and/or adjusted as directed by supervisors or mud engineer.</p> <p>3.2. All equipment is cleaned and visually inspected for leaks and proper operation, in accordance with specifications.</p> <p>3.3. Faults or potential faults are identified and reported immediately.</p> <p>3.4. Requirement for repair or maintenance of mud conditioning equipment is identified, recorded and reported.</p> <p>3.5. Screens or cones are replaced as necessary, on shakers, desilters, desanders in accordance with specifications.</p> <p>3.6. Periodic or scheduled preventative maintenance on all mud treatment units are performed in accordance with specifications.</p>
4. Monitor mud	<p>4.1. Mud properties and parameters are monitored and recorded</p> <p>4.2. Alarms are set to monitor mud.</p> <p>4.3. Viscosity and weight of mud are checked conform to specifications as directed by mud engineer.</p> <p>4.4. Appropriate volumes and types of drilling fluids are maintained as required by well program or company.</p> <p>4.5. Appropriate mixing procedures are used to obtain desired properties.</p> <p>4.6. Proper safety procedures and equipment are applied for mixing and handling of chemicals.</p> <p>4.7. Warning signs of a kick and report are recognized immediately.</p>
4. Operate and service transfer (butterfly) valves in mud pits	<p>4.1. Valves are aligned as appropriate.</p> <p>4.2. Valve stems of butterfly valves are lubricated as appropriate.</p> <p>4.3. Transfer valves are cleaned and inspected when pits are empty.</p> <p>4.4. Defective parts are replaced or repaired as necessary.</p>
5. Recognise warning signs of kicks	<p>5.1. Pit level is monitored, adjusted and reported.</p> <p>5.2. Mud properties are monitored and reported.</p> <p>5.3. Size of cuttings is monitored and reported.</p> <p>5.4. Volume of mud returns is monitored and reported.</p>

Variable	Range
Relevant compliance documentation	may include: <ul style="list-style-type: none"> • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Hazards	may include: <ul style="list-style-type: none"> • blow out gas to surface • ignition of gas • toxic gases • pressurized coal seam gas system
Coordination requirements	may include: <ul style="list-style-type: none"> • drill team • operators of other equipment • maintenance personnel • supervisors • worksite personnel
Equipment	may include: <ul style="list-style-type: none"> • shaker • degasser • desilter • desander • mud cleaner • agitators
Recording requirements	may include: <ul style="list-style-type: none"> • mud test recording • pit level • service and maintenance • replacement parts • shaker screens • mud properties • volume of liquid mud • size of cuttings • pit level • service and maintenance • replacement parts • chemical stocks
Recognised warning signs of a kick	are: <ul style="list-style-type: none"> • pit level change • mud property change • volume of mud change • size of cuttings change and pump pressure
Alarm systems	may include: <ul style="list-style-type: none"> • gas

	<ul style="list-style-type: none"> • fire • high and low alarm • mud density alarm • low/high pressure
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Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions for operating of mud systems • implementation of requirements, procedures and techniques for the safe, effective and efficient operating of mud systems • working with others to undertake the operating of mud systems that meets all of the required outcomes • consistent timely operating of mud systems that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • legislative and organisations safety guidelines, procedures and practices drilling operation procedures • drilling operation • functions of the mud pits • warning signs of kicks and indicators • company and statutory safety guidelines, procedures and practices • safe operating procedures when operating equipment • AOA policy procedure and practices • rig maintenance • normal drilling operations • non-routine drilling operations • man management/rig management • functions of the mud pits • warning signs of kicks • troubleshooting techniques
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures • recognise and report equipment malfunction or failure • supervise and train subordinates to provided standards • work as directed by driller timely and efficiently • operate equipment in accordance with good oilfield practice and company policy • align valves in pits to ensure correct pit usage, operability and safety • operate and service mud treatment equipment • operate mud condition equipment, including shakers, degasser, desilter, desander, mud cleaner and agitators • perform periodic or scheduled preventative maintenance on mud condition equipment • replace screens and cones on shakers and desilters/desanders

	<ul style="list-style-type: none"> • operate and service transfer valve • weigh mud and perform viscosity checks • maintain volumes and types of drilling fluids as required • use correct mixing procedures to ensure required properties in drilling fluid • use correct safety procedures and equipment for mixing and handling chemicals in accordance with manufacturer's data sheet • regularly monitor pit levels, mud properties and cuttings size • perform numerical calculations including: <ul style="list-style-type: none"> ➤ mud viscosity ➤ mud weight ➤ volume ➤ uphole velocity ➤ quantities ➤ pressure ➤ water loss
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: <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level III	
Unit Title	Conduct Secondary Blasting
Unit Code	MIN EDD3 11 0114
Unit Descriptor	This unit covers conducting secondary blasting in resources and infrastructure industries. It includes: planning and preparation; conducting blasting; and completing blasting operations. This unit is appropriate for those working in operational roles, at worksites within: Civil construction, Coal mining, Extractive industries, Metalliferous mining.

Elements	Performance Criteria
1. Plan and prepare for blasting	<p>1.1. Compliance documentation relevant to secondary blasting is accessed, interpreted and applied.</p> <p>1.2. Work instructions are obtained, confirmed and applied for the allocated task.</p> <p>1.3. Site conditions are inspected and assess and all potential hazards are identified, managed and reported and work area is ensured to be safe.</p> <p>1.4. Calculations are carried out to enable pattern design, loading and tying in of shots.</p> <p>1.5. The explosives and accessories required for the work are identified and confirmed.</p> <p>1.6. Safety information is accessed in accordance with site procedures.</p> <p>1.7. Vehicle, equipment and personnel support requirements are coordinated for the work.</p> <p>1.8. Personal protective equipment appropriate for the job used.</p> <p>1.9. Environmental issues are managed.</p> <p>1.10. Area is ensured to be free of blasting fumes before entry into work area.</p>
2. Conduct blasting	<p>2.1. Pre blasting procedures are carried out and exclusion zone is established.</p> <p>2.2. Appropriate explosives and/or techniques are used to achieve blast objective.</p> <p>2.3. Warnings are activated and relevant personnel notified of intended blasting in accordance with site procedures.</p> <p>2.4. Blast is hooked up and initiated.</p>
3. Complete blasting operations	<p>3.1. Post blast coordination is carried out and area safe is declared for re-entry.</p> <p>3.2. Site is inspected and dealt with non-conforming conditions.</p>

	<p>3.3. Equipment is inspected for defects and housekeeping activities are conducted.</p> <p>3.4. Reports are completed.</p> <p>3.5. End of shift information is passed to oncoming shift.</p>
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Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organization and site requirements and procedures • manufacturer's guidelines and specifications • Relevant Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Work instructions	<p>may come from briefings, handovers, plans and work orders and may be written or verbal, formal or informal and may include:</p> <ul style="list-style-type: none"> • nature and scope of tasks and achievement targets • site location and layout • 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 • type and quantity of explosives and accessories • equipment availability and/or requirements • plant or equipment defects • transport arrangements and/or requirements • safe storage requirements • public relations requirements
Site conditions	<p>may include:</p> <ul style="list-style-type: none"> • ventilation • ground conditions (e.g. scaling) • illumination • radioactivity • weather conditions • water
Hazards and associated risks	<p>may include:</p> <ul style="list-style-type: none"> • ground conditions • loose rocks from overhead • tipping hazards • fire/flames • not following safety precautions near an open stop

	<ul style="list-style-type: none"> • broken detonation leads • premature explosion • atmospheric contaminants • debris • faulty equipment • air blast and fly • high air and water pressures • high voltage electricity • oxygen-deficient atmosphere • unauthorized personnel • wet holes • radio frequencies and transmitters • EMF hazards (e.g. static electricity, lightning) • hot material • lost holes • drilling in butts • drilling into misfires 		
Explosives	<p>may include:</p> <ul style="list-style-type: none"> • high explosives • permitted explosives • propellant charges • black powder • shaped charges • plaster charges or charges in drill holes 		
Explosives and associated materials	<p>may include:</p> <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> ➤ bell wire ➤ delay mechanisms ➤ initiators ➤ meter readings ➤ safety fuses and tapes ➤ tape ➤ exploders ➤ circuit testers ➤ connecting wire and cables ➤ crimpers ➤ approved detonator chord cutters ➤ stemming rods ➤ loading poles 		
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	<ul style="list-style-type: none"> ➤ gas bags ➤ decking ➤ stemming ➤ hole liner ➤ blast monitoring equipment ➤ firing cables/bell wire ➤ remote firing equipment (e.g. PED)
Equipment	<p>may include:</p> <ul style="list-style-type: none"> • drill rig • pneumatic or electric drill/machine drill • other hand held tools • explosives and accessories • poles or rods • recommended/required PPE • ties and bagging material • sandbags • stemming • blast mats
Support requirements	<p>may include:</p> <ul style="list-style-type: none"> • other equipment and their operators • vehicles • public and site notification
Pre-blasting procedures	<p>may include:</p> <ul style="list-style-type: none"> • warnings • sentries • area clearance
Techniques	<p>may include:</p> <ul style="list-style-type: none"> • drilling • shot firing • snake-holding • bombing • Penetration Cone Fracture (PCF) • cannon • plastering • popping rocks with small charges
Blast objective	<p>may include:</p> <ul style="list-style-type: none"> • breaking oversize materials • unblocking
Environmental issues	<p>may include:</p> <ul style="list-style-type: none"> • ventilation • fume • dust
Post blast coordination	<p>may include:</p> <ul style="list-style-type: none"> • withdrawal of sentries • return of unused explosives and equipment • removal of signs • turning off safety devices • ventilation of area • use of gas detectors

Non-conforming conditions	<p>may include:</p> <ul style="list-style-type: none"> • misfires • blockages • break through • deviation • undercut • ground conditions • ventilation • water/wet holes • hot ground • fumes • dust
Exclusion zones	<p>may be marked or delineated by one or more of the following:</p> <ul style="list-style-type: none"> • signage • windrow • bund wall • ribbon • tape • witches' hats • rope • flags or pegs • sentries • gates

Evidence Guide			
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • the requirements, procedures and instructions for conducting secondary blasting • implementation of requirements, procedures and techniques for the safe, effective and efficient conducting of secondary blasting • working with others to undertake and complete secondary blasting that meets all of the required outcomes • consistent timely completion of secondary blasting that safely, effectively and efficiently meets the required outcomes 		
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • relevant legislation, Ethiopian standards and code of practice • site and equipment safety procedures • environmental requirements, including vibration, noise, dust and chemicals • site environmental requirements and constraints • types, physical and technical characteristics, uses and limitations of explosives and protection measures associated with their use • basic geological and technical information • blast plans • site operational procedures • planning processes 		
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	<ul style="list-style-type: none"> • explosive handling, transportation and storage requirements • equipment characteristics, technical capabilities and limitations • equipment maintenance procedures • isolation and lock out procedures • selection of appropriate explosives to meet site conditions • site charging procedures • emergency procedures • risk management including application of appropriate controls to identified risks • start-up and shutdown procedures • non-conforming conditions
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation 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 explosives preparation and mixing procedures • apply diagnostic techniques • apply explosives storage, handling and transport procedures • apply hazard identify procedures • apply procedures for identifying non-conformities • apply record and report maintenance procedures • apply environmental compliance requirements • use relevant 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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level III	
Unit Title	Apply Blowout Prevention Operational Procedures
Unit Code	MIN EDD3 12 0114
Unit Descriptor	<p>This unit covers the applying of blow out prevention operational procedures in the drilling industry. It includes: planning and preparing for applying of blow out prevention operational procedures; applying coal seam gas control strategies; coordinating coal seam gas control crew activities; operating and monitoring coal seam gas control equipment and processes; and applying coal seam gas kill procedures.</p> <p>This unit is appropriate for those working in a operational roles in coal-seam methane gas drilling operations, at worksites within: Coal mining and Drilling.</p>

Elements	Performance Criteria
1. Plan and prepare for applying of blow out prevention operational procedures	<p>1.1. Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2. Work instructions are obtained, confirmed and applied for the allocated task.</p> <p>1.3. Coordination requirements are resolved with others at the site prior to commencing and during work activities.</p>
2. Apply coal seam gas control strategies	<p>2.1. Approved methods are applied to control identified hazards associated with coal seam gas control under varying working conditions.</p> <p>2.2. Early warning signs of kicks and coal seam wells going under-balanced are recognized and responded to while drilling.</p> <p>2.3. Kick indicators are recognized and kick detection methods and responses applied during coal seam gas control operations.</p> <p>2.4. Equipment is operated to control swabbing and surging.</p> <p>2.5. Tripping methods are applied in accordance with operating requirements.</p> <p>2.6. Shut-in procedures are performed for bottom-drilling and coal seam gas tripping-in/out according to requirements.</p> <p>2.7. Relevant requirements and regulations related to coal seam gas control and influx prevention are applied during operations.</p> <p>2.8. Records and reports are prepared according to requirements.</p>
3. Coordinate coal seam gas control crew activities	<p>3.1. Assistants of their roles and responsibilities in a coal seam gas control situation are informed and their application is monitored.</p>

	<p>3.2. Operational activities and information are communicated to other crew during coal seam gas control and blow out prevention operations.</p> <p>3.3. Coal seam gas control drills and exercises are conducted to ensure crew readiness for emergency situations.</p>
4. Operate and monitor coal seam gas control equipment and processes	<p>4.1. Availability and set-up of coal seam gas control equipment are verified.</p> <p>4.2. Coal seam gas control equipment is inspected for safety and fitness-for-purpose and faults and malfunctions are rectified and/or reported.</p> <p>4.3. Coal seam gas control equipment is installed, tested and operated to operational requirements.</p> <p>4.4. Measuring and testing equipment and devices are monitored, read and interpreted to ensure planned, safe coal seam gas control.</p> <p>4.5. Installation, maintenance and replacement of equipment are assisted.</p>
5. Apply coal seam gas kill procedures	<p>5.1. Coal seam gas control procedures and activities are confirmed with crew members.</p> <p>5.2. Pressures and gauges are checked, read, interpreted and recorded and corrective action is undertaken.</p> <p>5.3. Operational instructions are applied.</p> <p>5.4. Coal seam gas control working practices are applied.</p> <p>5.5. Coal seam gas kill methods are applied according to requirements.</p> <p>5.6. The operation of BOP is monitored.</p> <p>5.7. The operation of BOP control system is monitored and adjusted.</p> <p>5.8. Circulation and circulation paths are monitored and controlled to ensure effective coal seam gas control.</p> <p>5.9. Emergency shutdown procedures are carried out.</p> <p>5.10. Incident information is communicated to other crew members.</p>

Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Relevant Ethiopian standards and code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation

Work instructions	<p>may include:</p> <ul style="list-style-type: none"> • nature and scope of tasks • specifications • quality of finished works • achievement targets • operational conditions • obtaining of 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 • contamination control requirements • environmental control requirements • barricade and signage requirements
Coordination requirements	<p>may include:</p> <ul style="list-style-type: none"> • drill team • other equipment operators • maintenance personnel • supervisors • worksite personnel
Hazards	<p>may include:</p> <ul style="list-style-type: none"> • blow out gas to surface • ignition of gas • toxic gases • pressurized coal seam gas system
Working conditions	<p>may include:</p> <ul style="list-style-type: none"> • night time operations • day time operations • hot climates • cold climates • snow • wet weather conditions • high wind
Early warning signs	<p>may be:</p> <ul style="list-style-type: none"> • rate of penetration trends • drilling break • trends shown in torque/drag
Kick indicators	<p>may include:</p> <ul style="list-style-type: none"> • flow from coal seam gas (pump off) • increase in flow from coal seam gas (pumps on) • pit volume gain
Swabbing and surging	<p>may be affected by:</p> <ul style="list-style-type: none"> • coal seam gas and pipe geometry • coal seam gas depth • fluid characteristics

	<ul style="list-style-type: none"> • coal seam gas conditions and formation properties • tool pulling and running speeds • BHA configuration
Records and reports	<p>may include:</p> <ul style="list-style-type: none"> • specifications • operator's instructions • drilling program • technical information • daily pre-tour checklist • daily pre-drilling checklist • BOP critical test parameters • AP RP 53 • tour sheet • tour reports and drilling logs • kill sheet • incident report form • drilling line record sheet • shut-in procedures • equipment damage report
Communications	<p>may include:</p> <ul style="list-style-type: none"> • 2-way radio • hand signals • telephone • public address system • written work instructions
Drills and exercises	<p>may include:</p> <ul style="list-style-type: none"> • pit drill • trip drill • abandonment drill • evacuation
Coal seam gas control equipment	<p>may include:</p> <ul style="list-style-type: none"> • mud system • blow out preventer • manifolds and chokes • accumulator • degassers • monitors • diverters • auxiliary equipment • pressure measuring devices • gas detection equipment and devices • Washington-type diverters
Monitoring, reading and interpreting	<p>may apply to:</p> <ul style="list-style-type: none"> • drilling fluid gain or loss • drilling parameters • pressure gauges • mud balance values • pump stroke counters

	<ul style="list-style-type: none"> • gas readings • amount of fluid added to coal seam gas • kick warnings and indicators • circulation rate
Coal seam gas control procedures and activities	<p>may include:</p> <ul style="list-style-type: none"> • time of coal seam gas shut-in • initial shut-in pressures • stage of kill • type of kill procedure employed • status of coal seam gas control equipment • flow path for coal seam gas control method • agreed procedures
Corrective actions	<p>may include:</p> <ul style="list-style-type: none"> • changing over pumps in the event of primary failure • using secondary choke in the event of primary failure • using alternate preventer in the event of primary failure • running accumulator emergency backup in case of primary failure
Coal seam gas kill methods	<p>may include:</p> <ul style="list-style-type: none"> • bringing pump up to kill speed • maintaining constant bottom coal seam gas pressure • shutting down the kill operation while maintaining a constant bottom coal seam gas pressure • controlling the influx using the Driller's Method
Monitoring and adjusting	<p>may include:</p> <ul style="list-style-type: none"> • pressures • volumes • flows
Monitoring and controlling circulation and circulation paths	<p>may include:</p> <ul style="list-style-type: none"> • existing and alternative paths from the pump through the choke manifold to the disposal system • valve status for specific circulating paths • assessing the circulation hydrostatic head to determine of a drop in the level of drilling fluid in the annulus on hydrostatics balancing pressure
Operational instructions	<p>may include:</p> <ul style="list-style-type: none"> • type of kill procedure to use • type of shut-in procedure to use • action to be taken in the event of approaching MAASP • monitoring pit levels
Working practices	<p>may include:</p> <ul style="list-style-type: none"> • confirmation of shut-in • monitoring of shut-in pressures • monitoring of accumulator pressures • correct circulation rate to be maintained during kill • monitoring pump efficiency • individual operation • team operation

	<ul style="list-style-type: none"> • use of personal protective equipment • consideration of H₂S and other toxic substances • consideration of flammables and ignition sources • maintaining continuous communication • reacting to on-site emergencies
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Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions for applying blow out prevention operational procedures • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of the applying of blow out prevention operational procedures • working with others to undertake and complete the applying of blow out prevention operational procedures that meets all of the required outcomes • consistent timely completion of the applying of blow out prevention operational procedures that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • the principles and practices of coal seam gas control • coal seam gas control procedures and their application • risks and their controls related to coal seam gas control • BOP annular equipment - types and operating principles • BOP control system principles • operating principles of chokes and manifolds • kill principles and methods • effects of hydrostatic pressure when drilling through gas bearing formations • sources of ignition and their dangers and controls • function, installation, operation, maintenance and use of coal seam gas control and auxiliary equipment • causes, effects and response to equipment failures • drilling parameters and their interpretation • purpose, operation and interpretation of measuring and testing devices • kick detection warnings and indications and the responses to them • purpose, type and conduct of coal seam gas control emergency drills and exercises • causes and effects of swabbing and surging • pressure concepts and effects • communication methods and protocols during coal seam gas control operations • influx parameters • safe coal seam gas shut-in requirements and procedures • tripping requirements and techniques • constant bottom coal seam gas pressure method • emergency shutdown methods

	<ul style="list-style-type: none"> • type, format and implementation of coal seam gas control documents
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures • work in a team • take measurements • carryout calculations and estimations relevant to activities • interpret gauges • apply kick warning signs and indicators detection procedures • complete trip sheets • complete kill sheets • interpret work instructions and procedures • supervise drill assistant • conduct and evaluate drills and exercises • 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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level III	
Unit Title	Apply Effective Coal Seam Gas Control Practices
Unit Code	<u>MIN EDD3 13 0114</u>
Unit Descriptor	<p>This unit covers the application of effective coal seam gas control practices in the drilling industry. It includes planning and preparing for operations, applying coal seam gas control strategies, coordinating coal seam gas control crew activities, operating and monitoring coal seam gas control equipment and processes, and applying coal seam gas kill procedures.</p> <p>This unit is appropriate for those working in operational roles in coal-seam methane gas drilling operations, at worksites within: Coal mines and Drilling.</p>

Elements	Performance Criteria
1. Plan and prepare for operations	<p>1.1. Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2. Work instructions are obtained, confirmed and applied for the allocated task.</p> <p>1.3. Coordination requirements are resolved with others at the site prior to commencing and during work activities.</p>
2. Apply coal seam gas control strategies	<p>2.1. Approved methods are applied to control identified hazards associated with coal seam gas control under varying working conditions.</p> <p>2.2. Early warning signs of kicks and coal seam gas going under-balanced are recognized and responded to while drilling.</p> <p>2.3. Kick indicators are recognized and kick detection methods and responses applied during coal seam gas control operations.</p> <p>2.4. Equipment is operated to minimize swabbing and surging.</p> <p>2.5. Tripping methods are applied in accordance with operating requirements.</p> <p>2.6. Relevant components of industry requirements and government regulations related to coal seam gas control and influx prevention are applied during operations.</p> <p>2.7. Records and reports are prepared according to requirements.</p>
3. Coordinate coal seam gas control crew activities	<p>3.1. Assistants are informed of their roles and responsibilities in a coal seam gas control situation and their application is monitored.</p> <p>3.2. Operational activities and information are communicated to other crew during coal seam gas control operations.</p>

	3.3. Coal seam gas control drills and exercises are conducted to ensure crew readiness for emergency situations.
4. Operate and monitor coal seam gas control equipment and processes	<p>4.1. Availability and set up of coal seam gas control equipment are verified.</p> <p>4.2. Coal seam gas control equipment is inspected for safety and fitness-for-purpose and faults and malfunctions are rectified and/or reported.</p> <p>4.3. Coal seam gas control equipment is installed, tested and operated to manufacturers and operational requirements.</p> <p>4.4. Measuring and testing equipment and devices are monitored, read and interpreted to ensure planned, safe, effective coal seam gas control.</p> <p>4.5. Installation, maintenance and replacement of equipment are assisted.</p>
5. Apply coal seam gas kill procedures	<p>5.1. Coal seam gas control procedures and activities are confirmed with crew members.</p> <p>5.2. Operational instructions are applied.</p> <p>5.3. Coal seam gas control working practices are applied.</p> <p>5.4. Coal seam gas kill methods are applied according to requirements.</p> <p>5.5. Emergency shutdown procedures are carried out.</p> <p>5.6. Incident information is communicated to other crew members.</p>

Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> legislative, organisational and site requirements and procedures manufacturer's guidelines and specifications Relevant Ethiopian standards code of practice Employment and workplace relations legislation Equal Employment Opportunity and Disability Discrimination legislation
Work instructions	<p>may come from briefings, handovers, plans and work orders and may be written or verbal, formal or informal and may include:</p> <ul style="list-style-type: none"> nature and scope of tasks specifications quality of finished works achievement targets operational conditions obtaining of permits required

	<ul style="list-style-type: none"> • site layout • out of bounds areas • worksite inspection requirements • lighting conditions • plant or equipment defects • hazards and potential hazards • coordination requirements or issues • contamination control requirements • environmental control requirements • barricade and signage requirements
Coordination requirements	<p>may include:</p> <ul style="list-style-type: none"> • drill team • other equipment operators • maintenance personnel • supervisors • worksite personnel
Hazards	<p>may include:</p> <ul style="list-style-type: none"> • blow out gas to surface • ignition of gas • toxic gases • pressurized coal seam gas system
Working conditions	<p>may include:</p> <ul style="list-style-type: none"> • night time operations • day time operations • hot climates • cold climates • snow • wet weather conditions • high wind
Early warning signs	<p>may be:</p> <ul style="list-style-type: none"> • rate of penetration trends • trends shown in torque/drag
Kick indicators	<p>may include:</p> <ul style="list-style-type: none"> • flow from coal seam gas (pump off) • increase in flow from coal seam gas (pumps on) • pit volume gain
Swabbing and surging	<p>may be affected by:</p> <ul style="list-style-type: none"> • coal seam gas and pipe geometry • coal seam gas depth • fluid characteristics • coal seam gas conditions and formation properties • tool pulling and running speeds • BHA configuration
Records and reports	<p>may include:</p> <ul style="list-style-type: none"> • specifications • operator's instructions • drilling program • technical information

	<ul style="list-style-type: none"> • daily pre-tour checklist • daily pre-drilling checklist • AP RP 53 • tour sheet • tour reports and drilling logs • kill sheet • incident report form • drilling line record sheet • shut-in procedures • equipment damage report
Communications	<p>may include:</p> <ul style="list-style-type: none"> • 2-way radio • hand signals • telephone • public address system • written work instructions
Drills and exercises	<p>may include:</p> <ul style="list-style-type: none"> • pit drill • trip drill • abandonment drill • evacuation
Coal seam gas control equipment	<p>may include:</p> <ul style="list-style-type: none"> • mud system • diverters • auxiliary equipment • pressure measuring devices • gas detection equipment and devices • diverters
Monitoring, reading and interpreting	<p>may apply to:</p> <ul style="list-style-type: none"> • drilling fluid gain or loss • drilling parameters • pressure gauges • mud balance values • pump stroke counters • gas readings • amount of fluid added to coal seam gas • kick warnings and indicators • circulation rate
Coal seam gas control procedures and activities	<p>may include:</p> <ul style="list-style-type: none"> • time of coal seam gas shut-in • initial shut-in pressures • stage of kill • type of kill procedure employed • status of coal seam gas control equipment • flow path for coal seam gas control method • agreed procedures
Operational instructions	<p>may include:</p> <ul style="list-style-type: none"> • type of kill procedure to use

	<ul style="list-style-type: none"> • type of shut-in procedure to use • action to be taken in the event of approaching MAASP • monitoring pit levels
Working practices	<p>may include:</p> <ul style="list-style-type: none"> • confirmation of shut-in • monitoring of shut-in pressures • monitoring of accumulator pressures • correct SPM to be maintained during kill • monitoring pump efficiency • individual operation • team operation • use of personal protective equipment • consideration of H₂S and other toxic substances • consideration of flammables and ignition sources • maintaining continuous communication • reacting to on-site emergencies
Coal seam gas kill methods	<p>may include:</p> <ul style="list-style-type: none"> • bringing pump up to kill speed • maintaining constant bottom coal seam gas pressure • shutting down the kill operation while maintaining a constant bottom coal seam gas pressure • controlling the influx using the Driller's Method

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Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions for applying effective coal seam gas control practices • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of the applying of blow out prevention operational procedures • working with others to undertake and complete the applying of effective coal seam gas control practices that meets all of the required outcomes • consistent timely completion of the applying of blow out prevention operational procedures that safely, effectively and efficiently meets the required outcomes
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • the principles and practices of coal seam gas control • coal seam gas control procedures and their application • risks and their controls related to coal seam gas control • kill principles and methods • effects of hydrostatic pressure when drilling through gas bearing formations • sources of ignition and their dangers and controls • function, installation, operation, maintenance and use of coal seam gas control and auxiliary equipment • causes, effects and response to equipment failures

	<ul style="list-style-type: none"> • drilling parameters and their interpretation • purpose, operation and interpretation of measuring and testing devices • kick detection warnings and indications and the responses to them • purpose, type and conduct of coal seam gas control emergency drills and exercises • causes and effects of swabbing and surging • pressure concepts and effects • communication methods and protocols during coal seam gas control operations • influx parameters • tripping requirements and techniques • emergency shutdown methods • type, format and implementation of coal seam gas control documents
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures • work in a team • take measurements • make calculations and estimations relevant to activities • interpret gauges • apply kick warning signs and indicators detection procedures • interpret work instructions and procedures • supervise drill assistant • conduct and evaluate drills and exercises • 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: <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level III	
Unit Title	Apply First Aid
Unit Code	MIN EDD3 14 0114
Unit Descriptor	This unit of competency describes the skills and knowledge required to provide first aid response, life support, management of casualty(s), the incident and other first aiders, until the arrival of medical or other assistance

Elements	Performance Criteria
1. Assess the situation	<p>1.1 Hazards in the situation that may pose a risk of injury or illness to self and others are identified, assessed and minimized.</p> <p>1.2 Immediate risk to self and casualty's health and safety is minimized by controlling any hazard in accordance with occupational health and safety requirements.</p> <p>1.3 Casualty is assessed and injuries, illnesses and conditions are identified.</p>
2. Apply first aid procedures	<p>2.1 Information is calmly provided to reassure casualty, adopting a communication style to match the casualty's level of consciousness.</p> <p>2.2 Available resources and equipment are used to make the casualty as comfortable as possible.</p> <p>2.3 The casualty is responded in a culturally aware, sensitive and respectful manner.</p> <p>2.4 The nature of casualty's injury/condition and relevant first aid procedures are determined and explained to provide comfort.</p> <p>2.5 Consent is sought from casualty prior to applying first aid management.</p> <p>2.6 First aid management is provided in accordance with established first aid principles and guidelines and/or regulations, legislation and policies and industry requirements.</p> <p>2.7 First aid assistance is sought from others in a timely manner and as appropriate.</p> <p>2.8 First aid equipment is correctly operated as required for first aid management according to manufacturer/supplier's instructions and local policies and/or procedures.</p> <p>2.9 Safe manual handling techniques are used as required.</p> <p>2.10 Casualty's condition is monitored and responded in accordance with effective first aid principles and procedures.</p>

	2.11 Casualty management is finalized according to casualty's needs and first aid principles.
3. Communicate details of the incident	<p>3.1 Ambulance support and/or appropriate medical assistance is/are requested according to relevant circumstances using relevant communication media and equipment.</p> <p>3.2 Assessment of casualty's condition and management activities is accurately conveyed to ambulance services /other emergency services/relieving personnel.</p> <p>3.3 Reports are prepared as appropriate in a timely manner, all relevant facts presented according to established procedures.</p> <p>3.4 Details of casualty's physical condition, changes in conditions, management and response to management are accurately recorded in line with established procedures.</p> <p>3.5 Confidentiality of records and information is maintained in line with privacy principles and statutory and/or organization policies.</p>
4. Evaluate own performance	<p>4.1 Feedback is sought from appropriate clinical expert.</p> <p>4.2 The possible psychological impacts on rescuers are recognized of involvement in critical incidents.</p> <p>4.3 Participate in debriefing/evaluation as appropriate to improve future response and address individual needs.</p>

Variable	Range
A hazard	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • A source or situation with the potential for harm in terms of human injury or ill-health, damage to property, the environment, or a combination of these
Hazards	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Physical hazards • Biological hazards • Chemical hazards • Hazards associated with manual handling
Risks	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Risks from equipment, machinery and substances • Risks from first aid equipment • Environmental risks • Exposure to blood and other body substances • Risk of further injury to the casualty • Risks associated with the proximity of other workers and bystanders • Risks from vehicles
Resources and equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • First aid kit • Auto-injector

	<ul style="list-style-type: none"> • Puffer/inhaler • Resuscitation mask or barrier • Spacer device
First aid management	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • The setting in which first aid is provided, including: <ul style="list-style-type: none"> ➢ workplace policies and procedures ➢ industry/site specific regulations, codes etc. ➢ OHS requirements ➢ state and territory workplace health and safety legislative requirements ➢ location and nature of the incident ➢ situational risks associated with, for example, electrical and biological hazards, weather, motor vehicle accidents ➢ location of emergency services personnel. • The use and availability of first aid equipment and resources • Infection control • Legal and social responsibilities of first aider
Established first aid principles	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Preserve life • Prevent illness, injury and condition(s) becoming worse • Promote recovery • Protect the unconscious casualty
Casualty's condition	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Abdominal injuries • Airway obstruction • Allergic reactions • Altered and loss of consciousness • Bleeding • Burns - thermal, chemical, friction, electrical • Chest pain/cardiac arrest • Injuries: cold and crush injuries; eye and ear injuries; head, neck and spinal injuries; minor skin injuries; needle stick injuries; soft tissue injuries including sprains, strains, dislocations • Near drowning • Envenomation - snake, spider, insect and marine bites • Environmental conditions such as hypothermia, hyperthermia, dehydration, heat stroke • Fractures • Medical conditions, including cardiac conditions, epilepsy, diabetes, asthma and other respiratory conditions • No signs of life • Poisoning and toxic substances (including chemical contamination) • Respiratory distress/arrest • Seizures • Shock

	<ul style="list-style-type: none"> • Stroke • Substance misuse - common drugs and alcohol, including illicit drugs.
Communication media and equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Telephones, including landline, mobile and satellite phones • HF/VHF radio • Flags • Flares • Two way radio • Email • Electronic equipment • Hand signals
Appropriate clinical expert	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Supervisor/manager • Ambulance officer/paramedic • Other medical/health worker
Vital signs	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Consciousness • Breathing • Circulation
Documentation	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Injury report forms • Workplace documents as per organization requirements <p>May include but not limited to:</p> <ul style="list-style-type: none"> • Time • Location • Description of injury • First aid management • Fluid intake/output, including fluid loss via: <ul style="list-style-type: none"> ➢ blood ➢ vomit ➢ faces and urine • Administration of medication including: <ul style="list-style-type: none"> ➢ time ➢ date ➢ person administering ➢ dose • Vital signs

Evidence Guide

Critical Aspects of Competence	<p>Demonstrate skills and knowledge of:</p> <ul style="list-style-type: none"> • working individually and, where appropriate, as part of a first aid team • Consistency of performance should be demonstrated over the required range of situations relevant to the workplace or community setting • Currency of first aid knowledge and skills is to be demonstrated in line with regulations, legislation and policies, and industry guidelines
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<p>Underpinning Knowledge and Attitudes</p>	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • National Guidelines relating to provision of first aid as outlined • Awareness of stress management techniques and available support • First aid management of: <ul style="list-style-type: none"> ➤ abdominal injuries ➤ allergic reactions ➤ altered and loss of consciousness ➤ bleeding ➤ burns - thermal, chemical, friction, electrical ➤ cardiac arrest ➤ casualty with no signs of life ➤ chest pain ➤ choking/airway obstruction • injuries: <ul style="list-style-type: none"> ➤ cold and crush injuries; eye and ear injuries; head, neck and spinal injuries; minor skin injuries; needle stick injuries; soft tissue injuries including sprains, strains, dislocations ➤ envenomation - snake, spider, insect and marine bites ➤ environmental impact such as hypothermia, hyperthermia, dehydration, heat stroke ➤ fractures ➤ medical conditions, including cardiac conditions, epilepsy, diabetes, asthma and other respiratory conditions ➤ near drowning ➤ poisoning and toxic substances (including chemical contamination) ➤ respiratory distress ➤ seizures ➤ shock ➤ stroke ➤ substance misuse - common drugs and alcohol, including illicit drugs • Social/legal issues: <ul style="list-style-type: none"> ➤ duty of care ➤ need to be culturally aware, sensitive and respectful ➤ importance of debriefing ➤ confidentiality ➤ own skills and limitations • basic occupational health and safety requirements in the provision of first aid • basic principles and concepts underlying the practice of first aid • chain of survival • first aiders' skills and limitations • infection control principles and procedures, including use of standard precautions
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	<ul style="list-style-type: none"> • priorities of management in first aid when dealing with life threatening conditions • procedures for dealing with major and minor injury and illness
Underpinning Skills	<p>Demonstrate Skills of:</p> <ul style="list-style-type: none"> • Administer medication in line with regulations, legislation and policies • Apply first aid principles • Call an ambulance and/or medical assistance according to relevant circumstances and report casualty's condition • Communicate effectively and assertively in an incident • Conduct an initial casualty assessment • Demonstrate correct procedures for performing CPR using a manikin, including standard precautions • ability to call an ambulance • consideration of the welfare of the casualty • safe manual handling • site management to prevent further injury • Evaluate own response and identify appropriate improvements where required • Follow OHS guidelines • Infection control, including use of standard precautions • Make prompt and appropriate decisions relating to managing an incident in the workplace • Plan an appropriate first aid response in line with established first aid principles, policies and procedures, ERC Guidelines and/or regulations, legislation and policies and industry requirements and respond appropriately to contingencies in line with own skills • Prepare a written incident report or provide information to enable preparation of an incident report • Provide assistance with self-medication as per subject's own medication regime and in line with legislation, regulations and policies and any available medical/pharmaceutical instructions • Use literacy and numeracy skills as required to read, interpret and apply guidelines and protocols
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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level III	
Unit Title	Monitor Implementation of Work Plan/Activities
Unit Code	MIN EDD3 15 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	<p>1.1 Efficiency and service levels are monitored on an ongoing basis.</p> <p>1.2 Operations in the workplace support overall enterprise goals and quality assurance initiatives.</p> <p>1.3 Quality problems and issues are promptly identified and adjustments are made accordingly.</p> <p>1.4 Procedures and systems are changed in consultation with colleagues to improve efficiency and effectiveness.</p> <p>1.5 Colleagues are consulted about ways to improve efficiency and service levels.</p>
2. Plan and organise workflow	<p>2.1 Current workload of colleagues is accurately assessed.</p> <p>2.2 Work is scheduled in a manner which enhances efficiency and customer service quality.</p> <p>2.3 Work is delegated to appropriate people in accordance with principles of delegation.</p> <p>2.4 Workflow is assessed against agreed objectives and timelines and colleagues are assisted in prioritisation of workload.</p> <p>2.5 Input is provided to appropriate management regarding staffing needs.</p>
3. Maintain workplace records	<p>3.1 Workplace records are accurately completed and submitted within required timeframes.</p> <p>3.2 Where appropriate completion of records is delegated and monitored prior to submission.</p>
4. Solve problems and make decisions	<p>4.1 Workplace problems are promptly identified and considered from an operational and customer service perspective.</p> <p>4.2 Short term action is initiated to resolve the immediate problem where appropriate.</p> <p>4.3 Problems are analysed for any long term impact and potential solutions are assessed and actioned in consultation with relevant colleagues.</p> <p>4.4 Where problem is raised by a team member, they are encouraged to participate in solving the problem.</p> <p>4.5 Follow up action is taken to monitor the effectiveness of solutions in the workplace.</p>

Variables	Range
Problems	May include but not limited to: <ul style="list-style-type: none"> • difficult customer service situations • equipment breakdown/technical failure • delays and time difficulties • competence
Workplace records	May include but is not limited to: <ul style="list-style-type: none"> • staff records and regular performance reports

Evidence Guide	
Critical Aspects of Competence	Demonstrates skills and knowledge in: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • monitor and improve workplace operations • plan and organize workflow • maintain 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: <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level III	
Unit Title	Apply Quality Control
Unit Code	MIN EDD3 16 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	<p>1.1 Agreed quality standard and procedures are acquired and confirmed.</p> <p>1.2 Standard procedures are introduced to organizational staff/personnel.</p> <p>1.3 Quality standard and procedures documents are provided to employees in accordance with the organization policy.</p> <p>1.4 Standard procedures are revised / updated when necessary.</p>
2. Assess quality of service delivered	<p>2.1 Services delivered are quality checked against organization quality standards and specifications.</p> <p>2.2 Service delivered are evaluated using the appropriate evaluation quality parameters and in accordance with organization standards.</p> <p>2.3 Causes of any identified faults are identified and corrective actions are taken in accordance with organization policies and procedures.</p>
3. Record information	<p>3.1 Basic information on the quality performance is recorded in accordance with organization procedures.</p> <p>3.2 Records of work quality are maintained according to the requirements of the organization.</p>
4. Study causes of quality deviations	<p>4.1 Causes of deviations from final outputs or services are investigated and reported in accordance with organization procedures.</p> <p>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.</p>
5. Complete documentation	<p>5.1 Information on quality and other indicators of service performance is recorded.</p> <p>5.2 All service processes and outcomes are recorded.</p>

Variable	Range
Quality check	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Check against design / specifications • Visual inspection and Physical inspection

Quality standards	May include but not limited to: <ul style="list-style-type: none"> • Materials • Components • Process • Procedures
Quality parameters	May include but not limited to: <ul style="list-style-type: none"> • Standard Design / Specifications • Material Specification

Evidence Guide	
Critical Aspects of Competence	Demonstrates skills and knowledge to: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level III	
Unit Title	Lead Workplace Communication
Unit Code	MIN EDD3 17 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: <ul style="list-style-type: none"> • Non-verbal gestures • Verbal • Face to face • Two-way radio • Speaking to groups • Using telephone • Written • Using Internet and Cell phone

Evidence Guide	
Critical Aspects of Competence	<p>Demonstrates skills and knowledge to:</p> <ul style="list-style-type: none"> • 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	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • Organization requirements for written and electronic communication methods • Effective verbal communication methods
Underpinning Skills	<p>Demonstrates skills to:</p> <ul style="list-style-type: none"> • 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	<p>Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competence may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Mineral Exploration and Development Drilling Level III	
Unit Title	Lead Small Teams
Unit Code	MIN EDD3 18 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.	<p>1.1 Learning and development needs are systematically identified and implemented in line with organizational requirements.</p> <p>1.2 Learning plan to meet individual and group training and developmental needs is collaboratively developed and implemented.</p> <p>1.3 Individuals are encouraged to self-evaluate performance and identify areas for improvement.</p> <p>1.4 Feedback on performance of team members is collected from relevant sources and compared with established team learning process.</p>
2. Foster individual and organizational growth.	<p>2.1 Learning and development program goals and objectives are identified to match the specific knowledge and skills requirements of Competence standards.</p> <p>2.2 Learning delivery methods are appropriate to the learning goals, the learning style of participants and availability of equipment and resources.</p> <p>2.3 Workplace learning opportunities and coaching/ mentoring assistance are provided to facilitate individual and team achievement of competencies.</p> <p>2.4 Resources and timelines required for learning activities are identified and approved in accordance with organizational requirements.</p>
3. Monitor and evaluate workplace learning.	<p>3.1 Feedback from individuals or teams is used to identify and implement improvements in future learning arrangements.</p> <p>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.</p> <p>3.3 Modifications to learning plans are negotiated to improve the efficiency and effectiveness of learning.</p> <p>3.4 Records and reports of competence are maintained within organizational requirement.</p>
4. Develop team commitment and cooperation.	<p>4.1 Open communication processes to obtain and share information is used by team.</p>

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

Variable	Range
Learning and development needs	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • 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	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • 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	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • 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	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • 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	<p>Demonstrates skills and knowledge to:</p> <ul style="list-style-type: none"> • 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	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • 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	<p>Demonstrates skills to:</p> <ul style="list-style-type: none"> • 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 • receive feedback and report, maintain effective relationships and conflict management • organize required resources and equipment to meet learning needs • provide support to colleagues • organize information; assess information for relevance and accuracy; identify and elaborate on learning outcomes • facilitation skills to conduct small group training sessions • relate to people from a range of social, cultural, physical and mental backgrounds
Resource Implications	Access to relevant workplace or appropriately simulated environment where assessment can take place
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level III	
Unit Title	Improve Business Practice
Unit Code	MIN EDD3 19 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	<p>1.1 Data required for diagnosis is determined and acquired.</p> <p>1.2 Competitive advantage of the business is determined from the data.</p> <p>1.3 SWOT analysis of the data is undertaken.</p>
2. Benchmark the business	<p>2.1 Sources of relevant benchmarking data are identified.</p> <p>2.2 Key indicators for benchmarking are selected in consultation with key stakeholders.</p> <p>2.3 Like indicators of own practice are compared with benchmark indicators.</p> <p>2.4 Areas for improvement are identified.</p>
3. Develop plans to improve business performance	<p>3.1 A consolidated list of required improvements is developed.</p> <p>3.2 Cost-benefit ratios for required improvements are determined.</p> <p>3.3 Work flow changes resulting from proposed improvements are determined.</p> <p>3.4 Proposed improvements are ranked according to agreed criteria.</p> <p>3.5 An action plan is developed and agreed to implement the top ranked improvements.</p> <p>3.6 Organizational structures are checked to ensure they are suitable.</p>
4. Develop marketing and promotional plans	<p>4.1 The practice vision statement is reviewed.</p> <p>4.2 Practice objectives are developed/ reviewed.</p> <p>4.3 Target markets are identified/ refined.</p> <p>4.4 Market research data is obtained.</p> <p>4.5 Competitor analysis is obtained.</p> <p>4.6 Market position is developed/ reviewed.</p> <p>4.7 Practice brand is developed.</p> <p>4.8 Benefits of practice/practice products/services are identified.</p> <p>4.9 Promotion tools are selected/ developed.</p>

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

Variable	Range
Data required includes:	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • 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	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • services/products • fees • location and timeframe
SWOT analysis	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • internal strengths such as staff capability, recognized

	<ul style="list-style-type: none"> • 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	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • salary cost and staffing • personnel productivity (particularly of principals) • profitability • fee structure • client base • size staff/principal • overhead/overhead control 		
Organizational structures	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Legal structure (partnership, Limited Liability Company, etc.) • organizational structure/hierarchy • reward schemes 		
Objectives should be 'SMART'	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • S: Specific • M: Measurable • A: Achievable • R: Realistic • T: Time defined 		
Market research data	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • data about existing clients • data about possible new clients • data from internal sources • data from external sources such as: <ul style="list-style-type: none"> ➤ 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: <ul style="list-style-type: none"> ➤ telephone surveys ➤ personal interviews ➤ mail surveys 		
Competitor analysis	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • competitor offerings • competitor promotion strategies and activities • competitor profile in the market place 		
Market position should include data on:	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • product 		
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	<ul style="list-style-type: none"> • 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	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • 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	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • features as perceived by the client • benefits as perceived by the client
Promotion tools	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • networking and referrals • seminars • advertising • press releases • publicity and sponsorship • brochures • newsletters (print and/or electronic) • websites • direct mail and telemarketing/cold calling
Yield per existing client	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • raising charge out rates/fees • packaging fees • reduce discounts • sell more services to existing clients

Evidence Guide	
Critical Aspects of Competence	<p>Demonstrates skills and knowledge in:</p> <ul style="list-style-type: none"> • 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	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • 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	<p>Demonstrates skill in:</p> <ul style="list-style-type: none"> • 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	<p>Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competence may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Mineral Exploration and Development Drilling Level III	
Unit Title	Prevent and Eliminate MUDA
Unit Code	MIN EDD3 20 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.	<p>1.1 Work instructions are used to determine job requirements, including method, material and equipment.</p> <p>1.2 Job specifications are read and interpreted following working manual.</p> <p>1.3 OHS requirements, including dust and fume collection, breathing apparatus and eye and ear personal protection needs are observed throughout the work.</p> <p>1.4 Appropriate material is selected for work.</p> <p>1.5 Safety equipment and tools are identified and checked for safe and effective operation.</p>
2. Identify MUDA.	<p>2.1 Plan of MUDA identification is prepared and implemented.</p> <p>2.2 Causes and effects of MUDA are discussed.</p> <p>2.3 Tools and techniques are used to draw and analyze current situation of the work place.</p> <p>2.4 Wastes/MUDA are identified and measured based on relevant procedures.</p> <p>2.5 Identified and measured wastes are reported to relevant personnel.</p>
3. Eliminate wastes/MUDA.	<p>3. 1. Plan of MUDA elimination is prepared and implemented.</p> <p>3. 2. Necessary attitude and the ten basic principles for improvement are adopted to eliminate waste/MUDA.</p> <p>3. 3. Tools and techniques are used to eliminate wastes/MUDA based on the procedures and OHS.</p> <p>3. 4. Wastes/MUDA are reduced and eliminated in accordance with OHS and organizational requirements.</p> <p>3. 5. Improvements gained by elimination of waste/MUDA are reported to relevant bodies.</p>
4. Prevent occurrence of wastes/MUDA.	<p>4.1 Plan of MUDA prevention is prepared and implemented.</p> <p>4.2 Standards required for machines, operations, defining normal and abnormal conditions, clerical procedures and procurement are discussed and prepared.</p>

	<p>4.3 Occurrences of wastes/MUDA are prevented by using visual and auditory control methods.</p> <p>4.4 Waste-free workplace is created using 5W and 1H sheet.</p> <p>4.5 The completion of required operation is done in accordance with standard procedures and practices.</p> <p>4.6 The updating of standard procedures and practices is facilitated.</p> <p>4.7 The capability of the work team that aligns with the requirements of the procedure is ensured.</p>
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Variable	Range
OHS requirements	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • 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	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • dust masks / goggles • glove • working cloth • first aid • safety shoes
Tools and techniques	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • 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

	<ul style="list-style-type: none"> • 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	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Make waste visible • Be conscious of the waste • Be accountable for the waste. • Measure the waste.
The ten basic principles for improvement	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • 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 50 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	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Red Tagging • Sign boards • Outlining • Andons • Kanban, etc.
5W and 1H	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Who • What • Where • When • Why • How

Evidence Guide	
Critical Aspects of Competence	<p>Demonstrates skills and knowledge to:</p> <ul style="list-style-type: none"> • 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

	<ul style="list-style-type: none"> • 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	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • 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	<p>Demonstrates skills to:</p> <ul style="list-style-type: none"> • 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

	<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level IV	
Unit Title	Manage Non-routine, Complex Technical Situations
Unit Code	<u>MIN EDD4 01 0114</u>
Unit Descriptor	<p>This unit covers the management of non-routine, complex technical situations in the resources and infrastructure industries. It includes collecting and analysing information, diagnosing and solving complex problems, managing non-routine, complex technical operations and using technology effectively.</p> <p>This unit is appropriate for those working in a supervisory role or as a technical specialist, at worksites within: Civil construction, Coal mining, Drilling, Extractive industries, Metalliferous mining</p>

Elements	Performance Criteria
1. Collect and analyze information	<p>1.1. Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2. Problems are anticipated by constantly monitoring and analyzing all available information.</p> <p>1.3. Operational problems are identified promptly and considered from an operational and client perspective.</p> <p>1.4. Information is assessed for relevance and applicability.</p> <p>1.5. Other sources of information are accessed to assist in problem solving.</p>
2. Diagnose and solve complex problems	<p>2.1. Actual problem is diagnosed using all available information.</p> <p>2.2. A range of possible solutions are determined from extensive knowledge and experience.</p> <p>2.3. Diagnostic parameters are communicated to senior management.</p> <p>2.4. Problems are analyzed for any long term impact and assess potential solutions.</p> <p>2.5. Most appropriate action is decided.</p> <p>2.6. Calculations necessary to implement action are carried out.</p> <p>2.7. Action is implemented to resolve the immediate problem.</p> <p>2.8. Effectiveness of action is monitored.</p> <p>2.9. Results of action taken are fed through to supervisors and management.</p>
3. Manage <i>non-routine/complex technical operations</i>	<p>3.1. A depth and breadth of knowledge and experience are applied to all operations.</p> <p>3.2. Potential problems are recognized and anticipated in both routine and non-routine and complex technical operations, and contingency planning is implemented.</p>

	<p>3.3. Client paperwork and record keeping forms and document unusual requests are adapted.</p> <p>3.4. Management is worked independently.</p> <p>3.5. Responsibility is taken for decision-making processes on the job.</p> <p>3.6. Necessary reports are prepared for a range of relevant topics.</p>
4. Use technology effectively	<p>4.1. Well developed physical and sensory skills are used to operate equipment to fullest capacity and anticipate potential problems.</p> <p>4.2. Scientific and technological principles are applied to evaluate and reshape operational procedures.</p>

Variable	Range
Compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organisation and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Problems	<p>may include:</p> <ul style="list-style-type: none"> • formation problems • loss of sample • lost circulation • pressure formations • differential pressure sticking • hole deviation • loss of sample integrity • encountering unexpected contaminants, or contaminants in higher than expected concentrations • old mine workings • fishing • loss of penetration • sudden loss of pump pressure
Information sources	<p>may include:</p> <ul style="list-style-type: none"> • technical manuals • team members • previous experience • drilling logs • mine site plans • geological data
Depth and breadth of knowledge and experience	<p>may relate to:</p> <ul style="list-style-type: none"> • equipment • products

	<ul style="list-style-type: none"> • ground conditions • rigs • drilling methods and techniques
Non-routine and complex technical operations	<p>may include:</p> <ul style="list-style-type: none"> • deep holes • formation kicks • bore hole stability • directional control • geometry bore holes and/or multilateral completion/technology

Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions for managing non-routine, complex technical situations • implementation of requirements, procedures and techniques for the safe, effective and efficient management of non-routine, complex technical situations • working with others to plan, prepare and manage non-routine, complex technical situations • evidence of the consistent successful management of non-routine, complex technical situations
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • communications systems, processes and procedures • high level mathematical skills • problem solving techniques and decision making • extensive operational knowledge
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures for managing non-routine, complex situations • reading and writing skills, to research problems and write reports • mathematical skills to carry out technical problem solving • plant diagnostic skills
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and Equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competency may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Mineral Exploration and Development Drilling Level IV	
Unit Title	Maintain Standard Procedures and Safe Working Practices
Unit Code	<u>MIN EDD4 02 0114</u>
Unit Descriptor	This unit covers the maintaining of standard procedures and safe working practices in the on shore and off shore oil and gas drilling industry. It includes: conducting daily rig maintenance and safety inspections, and complying with Government Regulations and Company Policies. This unit is appropriate for those working in a supervisory role or as a technical specialist, within: Drilling

Elements	Performance Criteria
1. Conduct daily rig maintenance and safety inspection	<p>1.1. Compliance documentation relevant to maintaining of standard procedures and safe working practices is accessed, interpreted and applied.</p> <p>1.2. Rig safety checks are undertaken before tour and equipment problems discussed with previous tour driller.</p> <p>1.3. Check maintenance procedures are spotted against plans, identify and rectify anomalies and maintain records.</p> <p>1.4. Pre-tour occupational health and safety meetings are conducted with team members.</p>
2. Comply with Government Regulations and Company Policies	<p>2.1. Regulations and procedures for controlling work and hazards are communicated to team members both on the rig floor and in camp accommodation areas.</p> <p>2.2. Employees' job responsibilities are allocated in accordance with regulations/company policies and within the bounds of their competence.</p> <p>2.3. Ensure team work rules are understood, applied and modeled by all crew members.</p> <p>2.4. Ensure regulations are obeyed by crew in line with statutory compliance.</p> <p>2.5. Rig operators are constantly assessed against regulations and policies.</p>

Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organisation and site requirements and procedures • manufacturer's guidelines and specifications • Relevant Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation

Communication	<p>occurs between:</p> <ul style="list-style-type: none"> • crew • operations representative • rig manager/superintendent • previous tour driller <p>channels include:</p> <ul style="list-style-type: none"> • two-way radio • hand signals • telephone • public address system • written work instructions • intranet or internet based
Regulations	<p>may include:</p> <ul style="list-style-type: none"> • Petroleum Acts relating to submerged lands • occupational health and safety • environmental
Records	<p>to be maintained include:</p> <ul style="list-style-type: none"> • reports to rig manager • short notes • maintenance sheets • safety checks • inventories • spare parts order lists • employee evaluation forms

Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence in:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions for the maintenance of standard procedures and safe working practices • implementation of appropriate procedures and techniques for the safe, effective and efficient maintenance of standard procedures and safe working practices • working with others to ensure that standard procedures and safe working practices are applied • provision of clear and timely instruction and supervision by the individual of those involved in applying standard procedures and safe working practices • evidence of the consistent successful maintenance of standard procedures and safe working practices
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • government regulations • company policies and procedures • client policies and procedures • occupational health and safety compliance • rig safety procedures and reporting • conflict resolution • negotiation skills and problem solving techniques

Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures • conduct rig inspections in accordance with statutory/company regulations • allocate job responsibilities • manage teams • negotiate and resolve conflict • apply policies and procedures • communicate effectively to crews/teams • maintain compliance • maintain operating records • solve 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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level IV	
Unit Title	Supervise On-site Operations
Unit Code	MIN EDD4 03 0114
Unit Descriptor	<p>This unit covers the supervision of on-site operations in the resources and infrastructure industries. It includes managing on-site safety, communicating regularly with others, diagnosing and solving routine and non-routine problems, controlling work programs to ensure objectives are met, coordinating work of the team and maintaining operating records.</p> <p>This unit is appropriate for those working in a supervisory role or as a technical specialist, at worksites within: Civil construction, Coal mining, Drilling, Extractive industries, and Metalliferous mining.</p>

Elements	Performance Criteria
1. Manage on-site safety.	<p>1.1. Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2. Safety rules and regulations, legislation and specific site instructions are relayed to team.</p> <p>1.3. Camp, site and equipment safety audits are conducted as required.</p> <p>1.4. Hazards on worksite are identified.</p> <p>1.5. A range of preventative measures are determined for potential work hazards on site.</p> <p>1.6. Procedures are communicated for the use of personal protective equipment and installed safety equipment clearly to the team.</p> <p>1.7. Clear instructions are provided to all team in emergency drills and their application.</p> <p>1.8. Methods are established for contacting all necessary medical services.</p> <p>1.9. Site safety and/or equipment safety induction training are provided as required to new personnel and visitors to the worksite.</p> <p>1.10. Occupational health and safety records for work area are completed accurately in accordance with workplace/company requirements.</p>
2. Communicate regularly with client, team, and other relevant parties.	<p>2.1. Team and other relevant parties are briefed regularly of up to date scope of activities.</p> <p>2.2. A good working relationship is maintained with landholder/client.</p> <p>2.3. Clauses in contract are honored confidentiality.</p> <p>2.4. Progress, problems encountered/anticipated and results are communicated regularly to client/supervisor as required.</p>

	2.5. Regular communication is maintained by radio/telephone or other means to report progress and/or request information or assistance.		
3. Diagnose and solve routine and non-routine problems.	<p>3.1. The existence and immediate effects/potential effects of the problem are confirmed by investigation.</p> <p>3.2. A clear and accurate definition of the problem is identified.</p> <p>3.3. The preferred option is identified after an analysis of available information and action plans are formulated.</p> <p>3.4. Additional equipment, contractors and/or advice are obtained as needed.</p> <p>3.5. Any contingency plans are outlined.</p> <p>3.6. Alternative duties are organized for teams if problems cause hold-ups in production.</p> <p>3.7. The preferred option is implemented.</p>		
4. Control work program to ensure objectives are met.	<p>4.1. Work progress is monitored regularly and corrective action taken if necessary.</p> <p>4.2. Availability of materials is ensured to be consistent with work schedules and appropriate to the requirements of the task.</p> <p>4.3. Specific tasks are allocated to make effective use of team.</p> <p>4.4. Alternative plans are prepared if required.</p> <p>4.5. Alternative plans are implemented as required to meet work program objectives.</p>		
5. Coordinate work of the team.	<p>5.1. All members of the team are made aware of their roles and responsibilities in the work plan.</p> <p>5.2. Operational targets are set in consultation with team, and checked at regular intervals.</p> <p>5.3. Assistance is provided when requested, to meet operational targets.</p> <p>5.4. Resources required to support changing work requirements are acquired.</p> <p>5.5. Workloads and required resources are allotted in accordance with modified work plans.</p> <p>5.6. Agreed time lines for tasks are communicated to team.</p>		
6. Maintain operating records.	<p>6.1. Range of records, reports and their required frequency are determined.</p> <p>6.2. Daily running records are kept to facilitate the completion of necessary documentation.</p> <p>6.3. Logs, records and shift reports are completed with numbers, quantities, dates and succinct descriptions.</p> <p>6.4. Variations to contract requirements on log are noted and discussed with originator and management if possible.</p>		
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	6.5. Required written reports are completed and submitted/distributed.
	6.6. Accurate measurements are taken and recorded as required.

Variable	Range
Compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> legislative, organisation and site requirements and procedures manufacturer's guidelines and specifications Relevant Ethiopian standards Employment and workplace relations legislation Equal Employment Opportunity and Disability Discrimination legislation
Hazards	<p>may include:</p> <ul style="list-style-type: none"> accidents fire emergencies such as chemical spills confined spaces, hot work areas environmental factors (e.g. heat/cold, flood, storm, lightning, contaminated sites, sunburn) flammable gases/liquids, explosives noise, dust, slips, trips and falls plant hazards such as rotating hazards and circulation hazards in-hole fluids, gases and contaminants hazards associated with aircraft, over water drilling, winching, crane use and forklifts
Problems	<p>may include:</p> <ul style="list-style-type: none"> safety issues environmental factors transport difficulties equipment failure
Down hole problems (drilling)	<p>that may be encountered may include:</p> <ul style="list-style-type: none"> formation problems loss of sample/sampling difficulties lost circulation pressure formations differential pressure sticking hole deviation loss of sample integrity encountering unexpected contaminants, or contaminants in higher than expected concentrations old mine workings fishing loss of penetration sudden loss of pump pressure
Action plans	<p>to solve problems are prepared according to:</p> <ul style="list-style-type: none"> objectives

	<ul style="list-style-type: none"> • resource requirements • coordination and feedback requirements • safety requirements and risk assessment priority requirements • company operating procedures
Records	<p>may include:</p> <ul style="list-style-type: none"> • daily operations reports • petty cash records • records of other purchases, i.e. accounts/credit cards • time sheets • plant and vehicle logs • maintenance records
Reports	<p>may include:</p> <ul style="list-style-type: none"> • operations reports • evaluation of sites • evaluation of equipment • injury and accident reports

Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence in:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions for supervision of on-site operations • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of supervision of on-site operations • working with others to plan, prepare and conduct on-site operations • evidence of the consistent successful supervision of on-site operations
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • operational and maintenance procedures • fault finding and troubleshooting techniques • team work • communication systems, processes and procedures (e.g. two way radio) • graphical representation (e.g. maps, diagrams, and their uses for interpretation and prediction) • required documentation (e.g. requisition forms, daily log reports)
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures for supervision of on-site operations • reading and writing ability • communication ability to train and instruct, receive and pass on information • hazard identification and risk assessment skills • delegation and people management skills • problem solving skills • record keeping and logging skills and counseling

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: <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level IV	
Unit Title	Manage Blasting Operations
Unit Code	MIN EDD4 04 0114
Unit Descriptor	<p>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.</p> <p>This unit is appropriate for those working in a supervisory role or as a technical specialist, within: Civil construction, Coal mining, Drilling, Extractive industries, and Metalliferous mining.</p>

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

<p>n of blasting activities</p>	<p>3.2. The blast plan is implemented.</p> <p>3.3. The blast monitoring system is applied in accordance with site procedures.</p> <p>3.4. Site and legislative procedures are applied to ensure that site inspections are implemented to confirm the blast plan.</p> <p>3.5. The availability of the type and quantity of explosives and associated materials required for blasting are confirmed and managed.</p> <p>3.6. The site procedures and legislative requirements are managed for the coordination of support requirements including vehicles, personnel and other equipment.</p> <p>3.7. Site procedures are applied for setting up and securing the blast area.</p> <p>3.8. The special requirements are applied for secondary blasting operations.</p> <p>3.9. Post-blasting coordination and inspection requirements are applied and managed.</p> <p>3.10. All statutory and site-required documents are completed.</p>		
<p>4. Manage special conditions</p>	<p>4.1. Potential hazards resulting from physical, biological or chemical situations which include heat, cold, climatic and electro-static condition are identified.</p> <p>4.2. Special conditions that may occur are controlled and monitored.</p> <p>4.3. Ensure that records and reports on special conditions are kept and maintained according to legislative and site requirements and procedures.</p>		
<p>5. Manage misfires</p>	<p>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.</p> <p>5.2. Blast area is inspected to identify misfires or potential misfires and cause of misfire identified.</p> <p>5.3. The misfire area is secured and information to communicated other personnel who may be affected.</p> <p>5.4. Procedures are applied for washing-out or re-charging, and re-firing is managed according to relevant legislation, standards and site procedures.</p> <p>5.5. The area which has been affected by blasting is communicated.</p> <p>5.6. Misfires are recorded and reported according to relevant legislation and site procedures.</p>		
<p>6. Manage the disposal of explosives</p>	<p>6.1. Damaged or deteriorated explosives and accessories are identified.</p> <p>6.2. An applicable disposal method is selected for explosives and accessories.</p>		
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	<p>6.3. The disposal of the damaged, deteriorated or surplus explosives is planned.</p> <p>6.4. The disposal of damaged, deteriorated and surplus explosives and detonators are carried out in accordance with legislative requirements and site procedures.</p> <p>6.5. Disposal activities are communicated to site emergency services.</p>
7. Manage maintenance of blasting equipment	<p>7.1. The equipment necessary is identified for use in preparing, initiating or monitoring blasting operations.</p> <p>7.2. Maintenance is monitored and routine inspection of blast and blast monitoring equipment conducted in accordance with manufacturer's requirements and site procedures.</p> <p>7.3. The maintenance of blast monitoring instrumentation is monitored to ensure valid calibration as specified in manufacturers' requirements and according to site procedures.</p> <p>7.4. Ensure that maintenance and inspection records are kept according to site, manufacturer's or legislative requirements.</p>

Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organisation and site requirements and procedures • manufacturer's guidelines and specifications • Relevant Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Explosives	<p>may include:</p> <ul style="list-style-type: none"> • 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	<p>may include:</p> <ul style="list-style-type: none"> • 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

	<ul style="list-style-type: none"> • trespassers • radio frequencies and transmitters • EMF hazards (e.g. static electricity, lightning) • hot ground
Storage locations	<p>may include:</p> <ul style="list-style-type: none"> • permanent licensed-to-store magazines • relocatable magazines • underground magazines • underground temporary storage • day boxes • on site temporary areas • designated transport vehicle
Environmental hazards	<p>may include:</p> <ul style="list-style-type: none"> • 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 requirements	<p>may include:</p> <ul style="list-style-type: none"> • 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	<p>may include:</p> <ul style="list-style-type: none"> • positioning stemming • cleaning up • weather check • fencing/signage and access routes • marking/hole identification • inspection • measuring holes • dewatering holes
Explosives and associated materials	<p>may include:</p> <ul style="list-style-type: none"> • blasting agents • detonators • detonating cords • water gels or emulsions • bulk or packaged

	<ul style="list-style-type: none"> • shaped charges • permitted explosives • high explosives • propellants • pressure loaders (kettle) • detonation mechanisms including: <ul style="list-style-type: none"> ➤ 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	<p>may include:</p> <ul style="list-style-type: none"> • shotfirers • magazine keepers • contractors • drillers • drivers • miners • visitors • trainees/apprentices • inspectors • licensed operators • maintenance staff • management • service personnel • supervisors • surveyors • tradespersons
Equipment	<p>may include:</p> <ul style="list-style-type: none"> • vehicles approved for carrying dangerous goods and explosives • explosives mixers • pumps • plugs (to seal finished holes prior to loading) • measuring tape

	<ul style="list-style-type: none"> • cutting implements • blast monitoring systems • video cameras
Post-blast coordination	<p>may include:</p> <ul style="list-style-type: none"> • withdrawal of sentries • return of unused explosives and equipment • removal of signs • turning off safety devices • ventilation of area
Inspections	<p>may include:</p> <ul style="list-style-type: none"> • positioning stemming • cleaning up • weather check • fencing/signage and access routes • marking/hole identification • inspection • measuring holes • dewatering holes
Documents	<p>may include:</p> <ul style="list-style-type: none"> • 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	<p>may be caused by:</p> <ul style="list-style-type: none"> • 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	<p>may show symptoms of:</p> <ul style="list-style-type: none"> • exudation • efflorescence • sweating • liquefaction • hardening

	<ul style="list-style-type: none"> • 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	<p>may include:</p> <ul style="list-style-type: none"> • 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	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • 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	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • Relevant Ethiopian standards and codes • 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

	<p>identify risks</p> <ul style="list-style-type: none"> • 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	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation 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: <ul style="list-style-type: none"> ➤ storage, handling and transport of explosives ➤ charging ➤ blast initiation ➤ post blast activities ➤ environmental impact monitoring ➤ equipment maintenance management ➤ explosives disposal ➤ records maintenance
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and Equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competency may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Mineral Exploration and Development Drilling Level IV	
Unit Title	Conduct Drilling Operations
Unit Code	MIN EDD4 05 0114
Unit Descriptor	This unit covers the conduct of drilling operations in the drilling industry. It includes planning and preparing for drilling operations, commencing drilling operations, maintaining drilling operations, drilling intermediate and/or main holes, and preparing for hole abandonment. This unit is appropriate for those working in a supervisory role or as a technical specialist, at worksites within: Drilling

Elements	Performance Criteria
1. Plan and prepare for drilling operations.	<p>1.1. Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2. Work instructions are obtained, confirmed and applied for the allocated task.</p> <p>1.3. All potential hazards are identified, managed and reported.</p> <p>1.4. Emergency response and occupational health and safety requirements, including the possibility of wellbore influx and well control, are communicated to crew members.</p> <p>1.5. Coordination requirements are resolved and maintained with others at the site prior to commencing and during work activities.</p> <p>1.6. Equipment, including mud riser/conductor/connections is checked, cleaned and lubricated and faults rectified and reported.</p> <p>1.7. Tool requirements are checked and assembled in wellhead area.</p>
2. Commence drilling operations.	<p>2.1. Drilling program requirements are double-checked to ensure safe operations</p> <p>2.2. Surface hole drilling is undertaken in accordance with Job Safety Analysis (JSA) and drilling program, and confirmed with operator's representative.</p> <p>2.3. Intermediate and main hole drilling operations are commenced.</p> <p>2.4. Drilling parameters are monitored, maintained and recorded in line with drilling program.</p> <p>2.5. Kill sheet requirements are calculated and maintained and integrity tests carried out and recorded in line with drilling program</p> <p>2.6. Accurate tubular tallies are maintained.</p>

	2.7. Casing running tools and casing are inspected and prepared for operation.
3. Maintain drilling operations.	<p>3.1. Cementing preparations are undertaken in accordance with operator's instructions and company procedures.</p> <p>3.2. Casing is run and prepared for cementing in accordance with job safety analysis, and cement in accordance with well engineering prognosis.</p> <p>3.3. Preparations are undertaken, and assistance is given in drilling stem tests and logging and coring operations.</p> <p>3.4. Crew is instructed on safe core recovery procedures.</p> <p>3.5. Arrangements are put in place for nipping-up and drilling out.</p>
4. Drill intermediate and/or main holes.	<p>4.1. Drilling program/timing schedule is confirmed and complied with procedures.</p> <p>4.2. Equipment and tools are checked for sizing and integrity with faults being rectified/reported.</p> <p>4.3. Hole is maintained within deviation limits.</p> <p>4.4. Sound drilling and safety practices are adhered to during nipping-up and pressure testing operations.</p>
5. Prepare for hole abandonment.	<p>5.1. Program is confirmed for completion or abandonment with operator representative.</p> <p>5.2. Tools/equipment is checked for integrity and faults are recorded and reported.</p> <p>5.3. Appropriate communication and recording requirements are completed to regulations and company policies/procedures.</p>

Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organisational and site requirements and procedures including: <ul style="list-style-type: none"> ➤ Job Safety Analysis (JSA) ➤ environmental guidelines ➤ specifications ➤ operator's instructions ➤ drilling program ➤ technical information ➤ Petroleum Act ➤ daily pre-tour checklist ➤ daily pre-drilling checklist ➤ Job Sheet Analysis (JSA) ➤ site specific manual • manufacturer's guidelines and specifications • Relevant Ethiopian standards

	<ul style="list-style-type: none"> • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Work instructions	<p>may come from briefings, handovers, plans and work orders and may be written or verbal, formal or informal and may include:</p> <ul style="list-style-type: none"> • discussing and confirming drill program requirements with crew members • pre-job requirements • drilling parameters, which may include: <ul style="list-style-type: none"> ➤ surveys ➤ pressure testing ➤ conditioning the hole ➤ circulating and penetration rates ➤ mud properties • BHA performance parameters, which may include, make-up torque • ancillary operation, which may include: <ul style="list-style-type: none"> ➤ logging ➤ cementing ➤ rig-up operations • pre-tour safety meeting • safety meeting/briefing • handover with oncoming driller • maintaining records including: <ul style="list-style-type: none"> ➤ tour sheet ➤ API metric tour report ➤ kill sheet ➤ incident report form ➤ drilling line record sheet ➤ shut-in procedures ➤ weekly safety meeting report ➤ pre-tour safety meeting report ➤ warning/counseling record ➤ equipment damage report • taking remedial action including alteration to drilling program as approved by operator's representative via operator company head office • nature and scope of tasks
Hazards	<p>may include</p> <ul style="list-style-type: none"> • working in proximity to drilling rig • working in different conditions including: <ul style="list-style-type: none"> ➤ night time operations ➤ day time operations ➤ hot climates ➤ cold climates ➤ wet weather conditions ➤ high wind

Coordination requirements	<p>may include instructing and communicating with:</p> <ul style="list-style-type: none"> • drill crew • other equipment operators • maintenance personnel • contractors • supervisors • site personnel
Equipment	<p>may include:</p> <ul style="list-style-type: none"> • wellhead equipment • casing centraliser and nails • thread lubricant • cement plugs • cement mix chemicals • Bottom Hole Assembly (BHA) • tubulars • mud equipment
Records	<p>may include:</p> <ul style="list-style-type: none"> • WIP sheets • WIP volumes • Kill sheets • Slow Circulation Rates (SCR)
Communication	<p>may be via a range of channels which may include:</p> <ul style="list-style-type: none"> • 2-way radio • hand signals • telephone • public address system • written work instructions • intranet and internet

Evidence Guide

Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence of:</p> <ul style="list-style-type: none"> • the requirements, procedures and instructions for conducting drilling operations • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of drilling operations • working with others to plan, prepare and conduct drilling operations • evidence of the consistent successful conduct of drilling operations
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • rig components • rig specifications • hole recovery procedures, including fishing, assembly service maintenance and tools • potential problems • down hole conditions • types of mud available

	<ul style="list-style-type: none"> • rigging and slinging • rig maintenance procedures • evacuation procedures
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures for conducting drilling operations • operate rig in a safe and productive manner • delegate work to individuals according to established levels of skill • administer effective communication skills - oral and written • troubleshoot and problem solve, including rise in rotary torque and mud pressure • forward planning in preparation of changing circumstances/contingencies • use a calculator and convert from metric to imperial measurements • shutdown the rig in an emergency and coordinate an orderly evacuation if necessary • perform calculations including: <ul style="list-style-type: none"> ➤ quantities ➤ up-hole velocity ➤ specific gravity ➤ volumes and capacities ➤ pressure calculations
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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level IV	
Unit Title	Supervise Geotechnical Drilling Operations
Unit Code	MIN EDD4 06 0114
Unit Descriptor	This unit covers the supervision of geotechnical drilling operations in civil construction. This includes: planning and preparing for operations; initiating operations; and monitoring, adjusting, communicating and reporting on the execution of the operations.

Elements	Performance Criteria
1. Plan and prepare for geotechnical drilling operations	<p>1.1. The application of the requirements and procedures relevant to undertake geotechnical drilling operations is accessed, clarified and ensured.</p> <p>1.2. The application of the specific task information and required outcomes relevant to undertake geotechnical drilling operations is accessed, clarified and ensured.</p> <p>1.3. An operational plan which makes best use of the available resources and for the safe effective and efficient conduct of the operations is prepared.</p>
2. Initiate geotechnical drilling operations	<p>2.1. The necessary resources are acquired and made for the safe, effective and efficient conduct of the operations.</p> <p>2.2. Clear and timely instructions are issued to team members and others involved, for the safe, effective and efficient conduct of the operations.</p>
3. Monitor, adjust, communicate and report on the execution of geotechnical drilling operations	<p>3.1. The execution of geotechnical drilling operations is monitored.</p> <p>3.2. Adjustments are initiated to geotechnical drilling practice or the operational plan to ensure safe, effective and efficient execution of the operations.</p> <p>3.3. Advice is provided to team members to overcome operational problems encountered during the execution of geotechnical drilling operations.</p> <p>3.4. Ensure plant equipment and tools maintenance requirements are carried out and recorded.</p> <p>3.5. Ensure reports are completed and submitted.</p> <p>3.6. Changes are recommended to improve the safety, efficiency and effectiveness of the execution of geotechnical drilling operations.</p>

Variable	Range
Task information	<p>may include:</p> <ul style="list-style-type: none"> • site geological data

	<ul style="list-style-type: none"> • site geotechnical data • site hydrological data • site engineering survey data • known and potential site hazards, constraints and conditions • site cultural and heritage information • task specifications • task drawings • sources of materials • other organisations and contractors involved in the task or related tasks • coordination, timing and budgeting requirements
Required outcomes	<p>may include:</p> <ul style="list-style-type: none"> • task specifications requirements • task drawings requirements • coordination requirements • activity scheduling requirements • unit cost requirements • overall task cost requirements • waste management requirements
Operational plan	<p>may include:</p> <ul style="list-style-type: none"> • human resource requirements • plant and machinery requirements • construction materials requirements • sub-contractor support requirements • waste disposal requirements • coordination requirements • activity scheduling • materials delivery scheduling • risk assessment and management requirements • occupational health and safety requirements • quality management requirements, including testing scheduling requirements • traffic management requirements • environmental requirements • task monitoring requirements • task performance monitoring requirements • communication requirements • reporting requirements
Resources	<p>may include:</p> <ul style="list-style-type: none"> • labour • plant, equipment and tools • highway haulage vehicles • construction materials • sub-contractor services
Instructions	<p>may include:</p> <ul style="list-style-type: none"> • briefings • handovers

	<ul style="list-style-type: none"> • work orders • toolbox meetings • site meetings
Teams members	<p>may include:</p> <ul style="list-style-type: none"> • other members of the organisations management team • members of the team directly involved in the task • suppliers representatives • sub-contractors representatives • supervisors or managers of other organisations who are involved in related tasks
Monitor	<p>may include:</p> <ul style="list-style-type: none"> • ongoing risk assessment • engineering survey • sampling and testing • observation and recording • general supervision
Initiate	<p>may include:</p> <ul style="list-style-type: none"> • written communication • oral communications
Geotechnical drilling operations practice	<ul style="list-style-type: none"> • identification of and responding to operational problems • equipment maintenance
Operational problems	<p>may include:</p> <ul style="list-style-type: none"> • equipment failure • drill string bogging • drill rods breaking • controlling drill hole direction • sample loss • drilling in difficult ground (caving, porous, fractured, reactive, cavities, running sands)
Geotechnical drilling methods	<p>may include:</p> <ul style="list-style-type: none"> • air drilling • conventional core drilling • wire-line core drilling • mud rotary drilling • down-hole hammer drilling • top-hole hammer drilling

Evidence Guide

Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions that are to apply in undertaking geotechnical drilling operations • implementation of appropriate procedures and techniques for the safe, effective and efficient achievement of the required outcomes of geotechnical drilling operations • working with others to plan, prepare and execute geotechnical drilling operations • operational plans which reflects the requirements of these
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	<p>geotechnical drilling operations and are capable of achieving all of their required outcomes</p> <ul style="list-style-type: none"> • resource plans which have made available adequate resources for the safe, effective and efficient execution of geotechnical drilling operations • provision of clear and timely instruction, advice and supervision by the individual of those involved in the undertaking of these geotechnical drilling operations • evidence of the consistent successful completion of geotechnical drilling operations under their supervision
<p>Underpinning Knowledge and Attitudes</p>	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • risk assessment and management requirement and procedures • statutory compliance requirements and procedures • occupational safety and health requirements and procedures • environmental management requirements and procedures • quality management requirements and procedures • work zone traffic management requirements and procedures • contract management requirements and procedures • communication requirements and procedures • administrative requirements and procedures • geotechnical drilling operations plant and equipment capabilities and application • plant, equipment and tools maintenance requirements and procedures <p>purpose of:</p> <ul style="list-style-type: none"> • operational techniques for the execution of geotechnical drilling operations • potential operational problems in the execution of geotechnical drilling operations • geotechnical drilling operations resource requirements and procedures • activities scheduling requirements and procedures • geotechnical drilling operations materials delivery requirements and procedures • job plan drafting of and administration requirements and procedures • reporting requirements and procedures • workplace relationship requirements and procedures • organisational, client and site operational requirements • relationship between various areas of underground mining and geotechnical drilling operations • team leadership techniques • works planning techniques • geotechnical drilling operations monitoring methods
<p>Underpinning Skills</p>	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • interpreting:

	<ul style="list-style-type: none"> ➤ legislative requirements and procedures ➤ organisational requirements and procedures ➤ client requirements and procedures ➤ manufacturer's requirements and procedures • interpreting geotechnical drilling operations: <ul style="list-style-type: none"> ➤ project site geological data ➤ site geotechnical data ➤ site hydrological data ➤ project site metrological data ➤ project engineering survey information ➤ project plans and drawings ➤ project specifications • preparing for and conducting of briefings, toolbox and site meeting • preparing of short messages • preparing and presenting of job reports • preparing and maintaining of log books and diaries • providing leadership • applying geotechnical drilling operations: <ul style="list-style-type: none"> ➤ performance monitoring skills ➤ troubleshooting skills ➤ problem solving skills • performing calculations for the execution of geotechnical drilling operations • providing recommendations for the improvement of the safe, effective and efficient execution of geotechnical drilling 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: <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level IV	
Unit Title	Carryout Well Control and Blowout Prevention
Unit Code	MIN EDD4 07 0114
Unit Descriptor	This unit covers the carrying out of well control and blow out prevention in the drilling industry. It includes: managing well control strategies; assessing well control equipment and reporting and recording faults; and carrying out well kill operations. This unit is appropriate for those working in supervisory or technical specialist roles, in coal-seam methane gas drilling operations worksites, within: Coal mining and Drilling.

Elements	Performance Criteria
1. Manage well control strategies	<p>1.1. Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2. Hazards are identified, and risks associated with well control operations assessed and managed under varying working conditions.</p> <p>1.3. Mud weight, pressure losses, drill stem and annular volumes, MAASP and initial and final circulating pressures are calculated.</p> <p>1.4. Identify interpret and respond to the early warning signs of kicks and well going under-balance while drilling.</p> <p>1.5. Kick indicators are recognized and kick detection methods and responses applied during well control operations.</p>
2. Assess well control equipment and report and record faults	<p>2.1. The purpose, use and relationship between equipment, indicators, counters and detection systems are identified to determine fitness of equipment for well control.</p> <p>2.2. Flow paths are identified for normal drilling operations and well control from appropriate sources.</p> <p>2.3. Well-control testing procedures and principles are identified and applied in accordance with company/regulatory requirements.</p> <p>2.4. Primary equipment failure well shut-in procedures are performed in accordance with company/regulatory requirements.</p> <p>2.5. Safe working practices and operational requirements are conformed.</p>
3 Carry out well kill operations	<p>3.1 Crew is briefed on well control procedures.</p> <p>3.2 Appropriate pre-recorded information is identified and applied.</p>

	<p>3.3 Pressures and gauges are checked, read, interpreted and recorded and corrective action is undertaken.</p> <p>3.4 Well kill procedures are determined and applied.</p> <p>3.5 Correct application of trip kill sheet data and well-closure procedure is demonstrated when dealing with influx and shutting in a well.</p> <p>3.6 Hydrostatic head is calculated at specific depths, and correct procedure applied when observing loss of circulation.</p> <p>3.7 Correct tripping methods and tests are performed in accordance with company/regulatory requirements.</p> <p>3.8 Stripping methods are applied in accordance with operating requirements.</p> <p>3.9 Recording and reporting procedures are applied in accordance with regulations and company policies/procedures.</p> <p>3.10 Well control incident is managed and communicated with crew.</p>
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Variable	Range		
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organisation and site requirements and procedures • manufacturer's guidelines and specifications • Relevant Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation 		
Hazards	<p>may include:</p> <ul style="list-style-type: none"> • blow out gas to surface • ignition of gas • toxic gases • pressurized coal seam gas system 		
Working conditions	<p>may include:</p> <ul style="list-style-type: none"> • night time operations • day time operations • hot climates • cold climates • snow • wet weather conditions • high wind 		
Early warning signs	<p>may be:</p> <ul style="list-style-type: none"> • rate of penetration trends • drilling break • trends shown in torque/drag 		
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Kick indicators	<p>may include:</p> <ul style="list-style-type: none"> • flow from wells (pump off) • increase in flow from well (pumps on) • pit volume gain
Equipment	<p>may include:</p> <ul style="list-style-type: none"> • mud system • blow out preventer • manifolds and chokes • accumulator • degassers • monitors • diverters
Well-control testing procedures	<p>may include:</p> <ul style="list-style-type: none"> • to be identified
Working practices	<p>may include:</p> <ul style="list-style-type: none"> • industry best practice • confirmation of shut-in • monitoring of shut-in pressures • monitoring of accumulator pressures • correct SPM to be maintained during kill • monitoring pump efficiency • individual operation • team operation • use of personal protective equipment • consideration of H₂S and other toxic substances • consideration of flammables and ignition sources • maintaining continuous communication • reacting to on-site emergencies
Briefing of crew	<p>may include:</p> <ul style="list-style-type: none"> • time of well shut-in • initial shut-in pressures • kill sheets • stage of kill • type of kill procedure employed • status of well control equipment • flow path for well control method • safety briefing/induction • pre-tour safety meeting • weekly safety meetings • Job Safety Analysis (JSA) • agreed procedures including: <ul style="list-style-type: none"> ➤ company ➤ facility ➤ client
Corrective action	<p>may include:</p> <ul style="list-style-type: none"> • changing over pumps in the event of primary failure • using secondary choke in the event of primary failure • using alternate preventer in the event of primary failure

	<ul style="list-style-type: none"> • running accumulator emergency backup in case of primary failure
Recording and reporting documents	<p>may include:</p> <ul style="list-style-type: none"> • specifications • operator's instructions • drilling program • technical information • relevant legislation • industry regulations • government requirements • daily pre-tour checklist • daily pre-drilling checklist • tour sheet • tour reports and drilling logs • kill sheet • incident report form • drilling line record sheet • shut-in procedures • weekly safety meeting report • equipment damage report
Managing crew during well control incident	<p>may include:</p> <ul style="list-style-type: none"> • informing subordinates of their roles and responsibilities in a well control situation • observing and reacting on the performance of subordinates that falls below acceptable levels • assessing crew performance to ensure competent handling of well control situations • communicating potential problems to the crew and taking necessary actions • instructing the crew to take up their assigned positions during well kill • allocating personnel assignments to increase the fluid density and handle the resulting increased volumes during the well kill
Communication channels	<p>may include:</p> <ul style="list-style-type: none"> • 2-way radio • hand signals • telephone • public address system • written work instructions • internet and intranet
Operational instructions	<p>may include:</p> <ul style="list-style-type: none"> • type of kill procedure to use • type of shut-in procedure to use • action to be taken in the event of approaching MAASP • monitoring pit levels

Evidence Guide			
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence in:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions for the carrying out of well control and blow out prevention • implementation of appropriate procedures and techniques for the safe, effective and efficient well control and blow out prevention • working with others to plan, prepare and conduct well control and blow out prevention • provision of clear and timely instruction and supervision by the individual of those involved in carrying out of well control and blow out prevention • evidence of the consistent successful well control and blow out prevention 		
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • risk management related to well control • well control procedures and their application • function, operation, maintenance and use of well control and auxiliary equipment • causes, effects and response to equipment failures • drilling parameters and their interpretation • measuring and testing device purpose and operation • calculations necessary for well control procedures • kick detection warnings and indications and the responses to them • kill methods and procedures • managing well control crew requirements • well control emergency drills • effects of swabbing and surging • pressure concepts and effects • formation integrity • influx parameters • safe well shut-in procedures • tripping requirements and techniques • constant bottom hole pressure method • accumulator • type, format and implementation of well control documentation 		
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures • work in a team • take measurements such as: <ul style="list-style-type: none"> ➤ penetration rate ➤ circulating pressure ➤ rotary torque ➤ active surface volume ➤ frequency 		
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	<ul style="list-style-type: none"> ➤ pump pressure • make calculations and estimations such as: <ul style="list-style-type: none"> ➤ pressure ➤ density ➤ volume ➤ height ➤ velocity ➤ length ➤ weight • interpret gauges, graphs • detect kick warning signs and indicators • complete trip sheets • complete kill sheets
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: <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level IV	
Unit Title	Supervise Mineral Exploration/Development Drilling Operations
Unit Code	MIN EDD4 08 0114
Unit Descriptor	This unit covers the supervision of mineral exploration /development n drilling operations in mining and extractive industries. This includes: planning and preparing for operations; initiating the operations; and monitoring, adjusting, communicating and reporting on the execution of the operations. This unit is appropriate for those working in a supervisory role or as a technical specialist, within: Drilling

Elements	Performance Criteria
1. Plan and prepare for mineral exploration /development operations	<p>1.1. The application of the requirements and procedures relevant to undertake mineral exploration /development drilling operations is accessed, clarified and ensured.</p> <p>1.2. The application of the specific task information and required outcomes relevant to undertake mineral exploration /development drilling operations is accessed, clarified and ensured.</p> <p>1.3. An operational plan is prepared for the operations which makes best use of the available resources and for the safe effective and efficient conduct of the operations</p>
2. Initiate mineral exploration /development drilling operations	<p>2.1. The necessary resources are acquired and made for the safe, effective and efficient conduct of the operations</p> <p>2.2. Clear and timely instructions are issued to team members and others involved, for the safe, effective and efficient conduct of the operations</p>
3. Monitor, adjust, communicate and report on the execution of mineral exploration /development drilling operations	<p>3.1. The execution of mineral exploration /development drilling operations is monitored</p> <p>3.2. Adjustments are initiated to mineral exploration /development drilling practice or the operations plan to ensure safe, effective and efficient execution of the operations</p> <p>3.3. Advice is provided to team members to overcome operational problems encountered during the execution of mineral exploration /development drilling operations</p> <p>3.4. Ensure plant equipment and tools maintenance requirements are carried out and recorded</p> <p>3.5. Ensure reports are completed and submitted</p> <p>3.6. Changes are recommended to improve the safety, efficiency and effectiveness of the execution of mineral exploration /development drilling operations.</p>

Variable	Range
Requirements and procedures	<p>may include:</p> <ul style="list-style-type: none"> • legislative • organisational • client • site • manufacturer's • risk assessment and management requirements and procedures • statutory compliance requirements and procedures • occupational safety and health requirements and procedures • environmental management requirements and procedures • cultural and heritage requirements and procedures • traffic management requirements and procedures • quality requirements and procedures • communication requirements and procedures • procurement requirements and procedures • workplace relations requirements and procedures • contract management requirements and procedures • administration requirements and procedures, including records and reporting • maintenance, servicing, and housekeeping requirements and procedures • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Mineral exploration /development drilling methods	<p>may include:</p> <ul style="list-style-type: none"> • air drilling • flight auger drilling • large diameter auger drilling • conventional core drilling • wire-line core drilling • mud rotary drilling • cable tool drilling • down-hole hammer and top-hole hammer drillings
Task information	<p>may include:</p> <ul style="list-style-type: none"> • site geological data • site geotechnical data • site hydrological data • site meteorological and site engineering survey data • known and potential site hazards, constraints and conditions • site cultural and heritage information • task specifications • task drawings • sources of materials • other organisations and contractors involved in the operations or related tasks • coordination, timing and budgeting requirements

Required outcomes	<p>may include:</p> <ul style="list-style-type: none"> • task specifications requirements • task drawings requirements • coordination requirements • activity scheduling requirements • unit cost requirements • overall operations cost requirements • waste management requirements
Resources	<p>may include:</p> <ul style="list-style-type: none"> • labour • plant, equipment and tools • highway haulage vehicles • construction materials • sub-contractor services
Instructions	<p>may include:</p> <ul style="list-style-type: none"> • briefings • handovers • work orders • toolbox meetings • site meetings
Teams members	<p>may include:</p> <ul style="list-style-type: none"> • other members of the organisations management team • members of the team directly involved in the operations • suppliers representatives • sub-contractors representatives • supervisors or managers of other organisations who are involved in related operations
Monitor	<p>may include:</p> <ul style="list-style-type: none"> • ongoing risk assessment • engineering survey • sampling and testing • observation and recording • general supervision
Initiate	<p>may include:</p> <ul style="list-style-type: none"> • written communication • oral communications
Mineral exploration drilling operations	<p>may include:</p> <ul style="list-style-type: none"> • identification of and responding to operational problems • equipment maintenance
Operational problems	<p>may include:</p> <ul style="list-style-type: none"> • equipment failure • drill string bogging • drill rods breaking • controlling drill hole direction • sample loss • drilling in difficult ground (caving, porous, fractured, reactive, cavities, running sands)

Evidence Guide			
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions that are to apply in undertaking mineral exploration /development drilling operations • implementation of appropriate procedures and techniques for the safe, effective and efficient achievement of the required outcomes of mineral exploration /development drilling operations • working with others to plan, prepare and execute mineral exploration /development drilling operations • operational plans which reflect the requirements of these mineral exploration /development drilling operations and are capable of achieving all of their required outcomes • resource plans which have made available adequate resources for the safe, effective and efficient execution of mineral exploration /development drilling operations • provision of clear and timely instruction, advice and supervision by the individual of those involved in the undertaking of these mineral exploration /development drilling operations • evidence of the consistent successful completion of mineral exploration /development drilling operations under their supervision 		
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • risk assessment and management requirement and procedures • statutory compliance requirements and procedures • occupational safety and health requirements and procedures • environmental management requirements and procedures • quality management requirements and procedures • work zone traffic management requirements and procedures • contract management requirements and procedures • communication requirements and procedures • administrative requirements and procedures • mineral exploration /development drilling operations plant and equipment capabilities and application • plant, equipment and tools maintenance requirements and procedures • operational techniques for the execution of mineral exploration /development drilling operations • potential operational problems in the execution of mineral exploration drilling operations • mineral exploration /development drilling operations resource requirements and procedures • activities scheduling requirements and procedures • mineral exploration /development drilling operations materials delivery requirements and procedures • job plan drafting of and administration requirements and procedures • reporting requirements and procedures 		
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	<ul style="list-style-type: none"> • workplace relationship requirements and procedures • organisational, client and site operational requirements • relationship between various areas of mining and extractive industry activities and mineral exploration /development drilling operations • team leadership techniques • works planning techniques • mineral production and development drilling operations monitoring methods
Underpinning Skills	<p>Demonstrate skills of:</p> <ul style="list-style-type: none"> • interpreting <ul style="list-style-type: none"> ➢ legislative requirements and procedures ➢ organisational requirements and procedures ➢ client requirements and procedures ➢ manufacturer's requirements and procedures • interpreting mineral exploration /development drilling operations: <ul style="list-style-type: none"> ➢ project site geological data, ➢ project site geotechnical data ➢ project site hydrological data ➢ project engineering survey information ➢ project plans and drawings ➢ project specifications • preparing for and conducting of briefings, toolbox and site meeting • preparing of short messages • preparing and presenting of job reports • preparing and maintaining of log books and diaries • providing leadership • applying mineral production and development drilling operations: <ul style="list-style-type: none"> ➢ performance monitoring skills ➢ troubleshooting skills ➢ problem solving skills • performing calculations for the execution of mineral production and development drilling operations • providing recommendations for the improvement of the safe, effective and efficient execution of mineral production and development drilling 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: <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level IV	
Unit Title	Rig up, Conduct Pre-spud Operations and Rig Down
Unit Code	MIN EDD4 09 0114
Unit Descriptor	This unit covers the conducting of rig up, pre-spud and rig down operations in the drilling industry. It includes: planning and preparing for rig up operations; rigging up to spud; preparing for drilling of surface hole/subsea hole; preparing for pre-spud operations; conducting operations as per drilling program; and carrying out rig down operations.

Elements	Performance Criteria
1. Plan and prepare for operations	<p>1.1. Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2. Work instructions are obtained, confirmed and applied for the allocated task.</p> <p>1.3. All potential hazards are identified, managed and reported.</p> <p>1.4. Coordination requirements are resolved with others at the site prior to commencing and during work activities.</p> <p>1.5. Pre rig-up procedure inspections (by rig manager, operator and crew) are carried out in accordance with standards for individual rigs.</p> <p>1.6. Movement of load and sequence of installation and location are coordinated in accordance with rig movement plan.</p> <p>1.7. Equipment is checked for damage and/or loss by moving contractor and report and BI in accordance with requirements.</p>
2. Rig up to spud	<p>2.1. Rig manager authorization is received and implemented to commence rig-up to spud operations.</p> <p>2.2. Detailed instructions on use and type of mud are received from the operator and distributed as appropriate and to required specifications.</p> <p>2.3. Potential rig-up problems are identified and corrective action is taken.</p> <p>2.4. Rig manager informed of operations is kept in accordance with legislative and company requirements.</p>
3. Prepare for drilling of surface hole/subsea hole	<p>3.1. Drilling and hoist equipment are checked, damage is reported to rig manager and recorded in accordance with company policies and procedures.</p> <p>3.2. Equipment checks are conducted for nippling-up or cross-checked with relevant procedures.</p>

	<p>3.3. Handling equipment is checked for correct sizing and if fit for purpose.</p> <p>3.4. Availability is confirmed and tubular is inspected, cleaned, calibrated and recorded in accordance with requirements.</p> <p>3.5. Well control equipment is checked against work program requirements.</p> <p>3.6. Special tool requirements are identified and checked if fit for purpose and approved for use.</p>
4. Prepare for pre-spud operations	<p>4.1. Pipe racks are locked with drill pipe and position drill collars for immediate use.</p> <p>4.2. Casing running tools are inspected and prepared for operation.</p> <p>4.3. Casing tallies are recorded and reported to appropriate company officer.</p>
5. Conduct operations as per drilling program	<p>5.1. Optimum circulating and penetration rates are determined and deviations checked in accordance with operators drilling program.</p> <p>5.2. Mud cleaning equipment and screens are continually checked for integrity and correct operation.</p> <p>5.3. Drilling fluid quantities are checked against program requirements with sufficient being in reserve to kill well and hole is kept on full trip.</p> <p>5.4. Correct mud properties are recorded on tour report.</p> <p>5.5. All equipments are operated in accordance with manufacturer regulations and company procedures.</p> <p>5.6. A sound working relationship is maintained with third party contractors.</p>
6. Rig down	<p>6.1. Rig manager authorization is received and excised to commence rig-down operations.</p> <p>6.2. Identify potential rig-down problems and take corrective action.</p> <p>6.3. Rig manager is kept informed of operations in accordance with legislative and company requirements.</p>

Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organisational and site requirements and procedures including: <ul style="list-style-type: none"> ➤ Petroleum Submerged Lands Act (PSLA) ➤ confined space ➤ occupational health and safety ➤ duty of care

	<ul style="list-style-type: none"> • manufacturer's guidelines and specifications • Relevant Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation • Job Sheet Analysis (JSA) • organisational documentation may include: <ul style="list-style-type: none"> ➤ hazard sheets ➤ lease layout ➤ rig layout ➤ rig standards/specifications ➤ instructions (e.g. use and type of mud) ➤ drilling plan ➤ chemical labels ➤ operator manuals ➤ load schedules ➤ operating procedures 		
Work instructions	<p>may come from briefings, handovers, plans and work orders and may be written or verbal, formal or informal and may include:</p> <ul style="list-style-type: none"> • crewing schedules and allocating jobs to crew with drilling plan and prognosis being discussed with crews • safety briefing/induction • pre-tour safety meeting • tour changeover discussions • operator's representative memorandums • weekly safety meetings • Job Safety Analysis (JSA) • instructions for specific jobs including: <ul style="list-style-type: none"> ➤ unloading of trucks ➤ un-securing of loads ➤ assembling of rig ➤ connecting power ➤ trench digging ➤ checking installation of safety equipment ➤ installing waste pits ➤ stowing equipment in correct stowage ➤ drilling parameters to be maintained ➤ mud density ➤ casing depths ➤ pre-safety check ➤ pre-spud check ➤ individual operation ➤ team operation ➤ use of personal protective equipment ➤ consideration of h2s and other toxic substances ➤ continuous communication maintained ➤ reacting to on-site emergencies • emergency disconnect sequence 		
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	<ul style="list-style-type: none"> • agreed procedures may include but are not limited to: <ul style="list-style-type: none"> ➤ company ➤ facility ➤ client • maintaining records including: <ul style="list-style-type: none"> ➤ crewing schedules ➤ rig up checklist ➤ pre-spud audit ➤ tubular tallies • nature and scope of tasks • specifications • quality of finished works • achieved targets • operational conditions • obtaining of required permits • site layout • out of bounds areas • worksite inspection requirements • lighting conditions • plant of equipment defects • coordination requirements or issues • contamination control requirements • environmental control requirements • barricade and signage requirements • remedial action to be taken to deal with errors, omissions and shortages include: <ul style="list-style-type: none"> ➤ corrective action request against procedures ➤ altering Job Safety Analysis (JSA) to include improved procedures
Hazards	<p>may include:</p> <ul style="list-style-type: none"> • working in proximity to drilling rig • working in different conditions including: <ul style="list-style-type: none"> ➤ night time operations ➤ day time operations ➤ hot climates ➤ cold climates ➤ wet weather conditions ➤ high wind
Coordination requirements	<p>may include:</p> <ul style="list-style-type: none"> • developing crewing schedules and allocating jobs to crews in line with operational requirements • other equipment operators • maintenance personnel • supervisors • site personnel
Equipment	<p>may include:</p> <ul style="list-style-type: none"> • drill strings • handling gear including tools • drilling rig and components

	<ul style="list-style-type: none"> • instrumentation • tubulars • mud system and auxiliary equipment
Instructions	<p>may be received via:</p> <ul style="list-style-type: none"> • 2-way radio • hand signals • telephone • public address system • written work instructions • internet or intranet communications
Corrective action	<p>may include:</p> <ul style="list-style-type: none"> • informing rig manager • informing company representative • allocating maintenance tasks to appropriate person
Record	<p>may include:</p> <ul style="list-style-type: none"> • damage reports • casing tallies • pre-spud operational reports

Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence in:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions for rig up, pre-spud and rig down operations • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of rig up, pre-spud and rig down operations • working with others to plan, prepare and conduct rig up, pre-spud and rig down operations • evidence of the consistent successful rig up, pre-spud and rig down operations
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • rigging and slinging • forklift operations • local authorities • rig specifications and measurements • metric-imperial conversion • marine operations • drilling program to pre-spud operations • drilling equipment • rig up procedures • casing • mud systems • routine drilling operations • Job Safety Analysis (JSA) • marine operations

Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures • oversee rigging • manage and maintain pre-spud operations • participate in inspections • develop crew schedules and allocate jobs • oversee mud-mixing operations • check equipment/tools and record, report and rectify faults • delegate • problem solve • plan for all circumstances • operate forklift in line with licensing requirements • read, interpret and apply regulations/company procedures • convert from metric to imperial measurement • carrying out calculations including: <ul style="list-style-type: none"> ➤ quantities ➤ up-hole velocity ➤ specific gravity ➤ volume ➤ hydrostatic pressures • operate machinery in a safe manner • communicate effectively with management, crew and contractors • meeting skills • negotiation skills • troubleshoot during drilling program • read documents including: <ul style="list-style-type: none"> ➤ load schedules ➤ operating procedures ➤ forms ➤ government specifications
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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level IV	
Unit Title	Apply Site Risk Management System
Unit Code	MIN EDD4 10 0114
Unit Descriptor	<p>This unit covers applying the site risk management system in resources and infrastructure industries. It includes: providing information to the work group; applying and monitoring participative arrangements, the procedures for providing training, for identifying hazards and assessing risks, for controlling risks; and the procedures for maintaining records.</p> <p>This unit is appropriate for those working in a supervisory role or as risk management technical specialist, on worksites within: Civil construction, Coal mining, Drilling, Extractive industries and Metalliferous mining.</p>

Elements	Performance Criteria
1. Provide information to the work group	<p>1.1. Compliance documentation relevant to applying the site risk management system is accessed, interpreted and applied.</p> <p>1.2. Relevant compliance documentation is accurately explained to the work group.</p> <p>1.3. Information on the organization's risk management policies, procedures and programs is provided to the work group in an accessible manner.</p> <p>1.4. Information about identified hazards and the outcomes of risk assessment are regularly provided and clearly explained and controlled to the work group.</p>
2. Apply and monitor participative arrangements	<p>2.1. The importance of effective consultative mechanisms is explained in managing risk to the work group.</p> <p>2.2. Consultative procedures are conducted and monitored to facilitate participation of work groups in managing work area hazards.</p> <p>2.3. Issues raised are promptly dealt with in accordance with organizational consultation procedures.</p> <p>2.4. The outcomes of consultation over risk management issues are recorded and promptly communicated to the work group.</p>
3. Apply and monitor the procedures for providing training	<p>3.1. Risk management training needs are systematically identified in line with organizational requirements.</p> <p>3.2. Arrangements are made in consultation with relevant individuals, to meet risk management training needs of team members.</p> <p>3.3. Workplace learning opportunities and coaching and mentoring assistance are provided to facilitate team and individual achievement of identified training needs.</p>

	3.4. Costs associated with provision of training are identified and reported for work team for inclusion in financial planning.
4. Apply and monitor procedures for identifying hazards and assessing risks	<p>4.1. Hazards and risks in the work area are identified and reported in accordance with risk management and related policies and procedures.</p> <p>4.2. Team members' hazard reports are prepared promptly in accordance with organizational procedures.</p>
5. Apply and monitor the procedures for controlling risks	<p>5.1. Procedures are applied for controlling risk using the hierarchy of controls and organizational requirements.</p> <p>5.2. Inadequacies in existing risk control measures are identified and reported in accordance with hierarchy of controls.</p> <p>5.3. Outcomes of reported inadequacies are monitored where appropriate to ensure a prompt organizational response.</p>
6. Apply and monitor the procedures for maintaining records	<p>6.1. Accurate completion and maintenance of risk management records of incidents in the work area are ensured in accordance with organizational requirements.</p> <p>6.2. Aggregate information and data from work area records are used to identify hazards and monitor risk control procedures in work area.</p>

Variable	Range
Compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organisation and site requirements and procedures • manufacturer's guidelines and specifications • Relevant Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Organisation's risk management policies, procedures and programs	<p>may include:</p> <ul style="list-style-type: none"> • risk management policy • site procedures and work instructions for hazard identification • site procedures and work instructions for risk assessment, selection and implementing of risk control measures • site incident (accident) investigation requirements • site risk audits and investigations requirements • site consultative arrangements for employees in work area • site hazard report procedures • site operating procedures and instructions • site emergency and evacuation procedures • site purchasing policies and procedures • site plant and equipment maintenance and use instructions • site hazardous substances use and storage procedures and work instructions • site dangerous goods transport and storage procedures and

	<p>work instructions</p> <ul style="list-style-type: none"> • site OHS arrangements for onsite contractors, visitors and members of the public • site First Aid provisions/medical practitioner contacts and attention instructions • site access procedures and instructions
Hazards identification	<p>may occur through activities such as:</p> <ul style="list-style-type: none"> • workplace inspections in area of responsibility • consulting work team members • housekeeping • risk audits and review of audit reports • daily informal employee consultation and regular formal employee meetings • checking equipment before and during work • review of health, safety, environmental, quality and other risk related records
Risk assessment	<p>is:</p> <ul style="list-style-type: none"> • the overall process of risk analysis and risk evaluation
Organisational consultation procedures	<p>may include:</p> <ul style="list-style-type: none"> • formal and informal meetings • health and safety committees • other committees, such as, planning and purchasing • involvement of employees in management and planning meetings • early response to employee suggestions, requests, reports and concerns put forward to management • counselling/disciplinary processes
Risk management	<p>is:</p> <ul style="list-style-type: none"> • the culture, processes and structure that are directed towards the effective management of potential opportunities and adverse risk <p>may be applied to:</p> <ul style="list-style-type: none"> • statutory compliance • OHS • environment • quality • property security • business risks, such as: <ul style="list-style-type: none"> ➢ credit management ➢ capital expenditure ➢ sales and marketing ➢ finance and accounting <p>are:</p> <ul style="list-style-type: none"> • the systematic application of management policies, procedures and practices to the task of establishing the context, identifying, analysing, evaluating, treating, monitoring and communicating risk
Consultation	<p>would typically include:</p> <ul style="list-style-type: none"> • regulatory authorities

	<ul style="list-style-type: none"> • tenderers • project managers • contractors • employees • community • customers • suppliers
Hazard	<p>is:</p> <ul style="list-style-type: none"> • a source of potential harm or a situation with a potential to cause loss
The policy	<p>is:</p> <ul style="list-style-type: none"> • the statement of overall intent and direction of the organisation in respect of the specific area of managerial responsibility
Procedures for controlling risk	<p>may include:</p> <ul style="list-style-type: none"> • removing the cause of the risk at its source (eliminating the hazard) • selecting control measures in accordance with the hierarchy (i.e. work through the hierarchy from most effective to least effective) • job/process/workplace re-design • consultation with employees and their representatives
Risk control	<p>is:</p> <ul style="list-style-type: none"> • the selection and implementation of appropriate options for dealing with risk
Monitoring	<p>is:</p> <ul style="list-style-type: none"> • checking, supervising, observing critically, or recording the progress of an activity, action or system on a regular basis in order to identify change
Risk management records	<p>may include:</p> <ul style="list-style-type: none"> • audit and inspection reports • hazard registers • risk analysis records • risk treatment reports • minutes of meetings (risk management, occupational health and safety, environmental etc) • induction, instruction, training and assessment • manufacturer's and supplier's information • dangerous goods and hazardous substances registers • plant and equipment maintenance and testing reports • workers compensation and rehabilitation records • First Aid/medical records • major incident and emergency response instructions • emergency contact lists • financial records and contract documents

Evidence Guide

Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence in:</p> <ul style="list-style-type: none"> • the requirements, procedures and instructions to apply the site risk management system 		
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	<ul style="list-style-type: none"> • implementation of appropriate procedures and techniques for the safe, effective and efficient application of the site risk management system • working with others to plan, prepare and apply the site risk management system • provision of clear and timely instruction and supervision by the individual of those involved in applying the site risk management system • evidence of the consistent successful application of the site risk management system
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • relevant legislation from all levels of government that effect business operations • legal responsibilities of employers, supervisors and employees in the workplace • site policies and procedures relating to hazard management, fire emergency, evacuation, incident and accident investigation and reporting • relevance of consultation as a key mechanism for improving workplace risk management • principles and practices of risk management • characteristics and composition of the workgroup
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply analyse skills to identify hazards and assess risks in the work area • apply data analysis skills including: • incident monitoring • environmental monitoring • evaluation of effectiveness of risk control measures • apply assessment skills to assess resources required to apply risk control measures • apply literacy skills for comprehending documentation and interpreting risk management requirements • apply coaching and mentoring skills to provide support to colleagues • demonstrate the ability to relate to people from a range of social, cultural and ethnic backgrounds and physical and mental abilities
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.
Assessment Methods	<p>Competency may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level IV	
Unit Title	Implement and Monitor Environmental Policies
Unit Code	MIN EDD4 11 0114
Unit Descriptor	<p>This unit covers the implementation and monitoring of environmental policies in the resources and infrastructure industries. It includes providing information to the work team, managing on-site safety, implementing and monitoring operational procedures, implementing and monitoring change and continuous improvement, implementing and monitoring recording procedures, and implementing and monitoring an environmental and energy efficiency management training program.</p> <p>This unit is appropriate for those working in a supervisory role or as a technical specialist, at worksites within: Civil construction, Coal mining, Drilling, Extractive industries, and Metalliferous mining.</p>

Elements	Performance Criteria
1. Provide information to the work team	<p>1.1. Compliance documentation relevant to the implementation and monitoring of environmental policies access, interpret and apply.</p> <p>1.2. Environmental and energy efficiency information provided to the work team is explained in a clear and concise manner and ensured to be readily accessible to all employees.</p> <p>1.3. Organization's activities/performance is conveyed to environmental and energy efficiency management and business sustainability.</p> <p>1.4. Links between environmental, energy consumption, financial, safety and other risk areas and how these are integrated in organizational policies and practices.</p> <p>1.5. Information on environmental and energy efficiency systems and procedures and other risk areas is provided within the area of management responsibility.</p>
2. Implement and monitor operational procedures	<p>2.1. Existing and potential environmental and energy efficiency risks are identified and assessed and/or required expert advice is sought.</p> <p>2.2. Prioritized recommendations from the assessments are carried out as part of the organization's operational procedures.</p> <p>2.3. Organizational environmental and energy efficiency policies and procedures, including risk policies and procedures are implemented.</p> <p>2.4. Tasks are allocated and outcomes monitored in</p>

	<p>accordance with organizational policies and targets.</p> <p>2.5. Contingency plan is implemented promptly when incidents occur.</p>
3. Implement and monitor change and continuous improvement	<p>3.1. Environmental and energy efficiency improvement plans are implemented for own work group and integrated with other operational activities.</p> <p>3.2. Best practice approaches are identified, implemented and monitored to improve environmental and energy efficiency performance by reducing environmental and greenhouse risk and waste.</p> <p>3.3. Suggestions and ideas about environmental energy efficiency management are sought from the work team and acted upon where appropriate.</p> <p>3.4. Suggestions are sought from supply chain at tender/contract stage for ways of improving environmental and energy consumption performance.</p>
4. Implement and monitor recording procedures	<p>4.1. Internal and external reporting procedures are identified and implemented.</p> <p>4.2. Environmental and energy efficiency records are maintained accurately and legibly and stored securely in a form accessible for reporting purposes.</p> <p>4.3. Information/records are monitored to identify trends that may require remedial action and used to promote continuous improvement of environmental and energy consumption performance.</p>
5. Implement and monitor an environmental and energy efficiency management training program	<p>5.1. Environmental and energy efficiency training needs are identified accurately, and knowledge gaps specified in environmental and energy efficiency corporate practices.</p> <p>5.2. Arrangements are made for fulfilling identified training needs for the work group with relevant parties.</p>

Variable	Range
Relevant Compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organisation and site requirements and procedures • manufacturer's guidelines and specifications • Relevant Ethiopian standards • award and enterprise agreements and relevant industrial instruments • relevant legislation from all levels of government that affects business operation, especially in regard to occupational health and safety, environmental and energy efficiency issues, equal opportunity, industrial relations and anti-discrimination • relevant industry code of practice

	<ul style="list-style-type: none"> • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Environmental and energy efficiency information	<p>may include:</p> <ul style="list-style-type: none"> • organisational policies and procedures • relevant environmental and energy efficiency legislative requirements • voluntary environmental agreements entered into with external organisations • continuous improvement policies and processes for the organisation
Work team	<p>may include:</p> <ul style="list-style-type: none"> • formal or unstructured groups, and two or more people
Environmental and energy efficiency performance	<p>may include:</p> <ul style="list-style-type: none"> • resource efficiency • minimisation of waste • recycling • reduction in use of non-renewable resources • all environmental incidents
Some approaches to environmental and energy efficiency performance	<p>may include:</p> <ul style="list-style-type: none"> • preventing and minimising the production of pollution (e.g. discharges to air, land and water, hazardous waste) • applying energy efficiency systems, action plans, surveys and audits • improving the company's operational energy consumption including stationary and non-stationary (transport) energy • improving housekeeping (e.g. using a broom instead of a hose, using old rags for cleaning instead of toxic cleaners or water) • substituting materials (e.g. replacing toxic, solvent-based coatings with water-based ones) • changing processes (e.g. mechanical cleaning, redesign of products/procedures so that materials are used more efficiently)
Business sustainability	<p>means:</p> <ul style="list-style-type: none"> • a sustainable business in this sense is profitable and competitive. Effective management of environmental impacts and energy efficiency initiatives can contribute to business sustainability by reducing costs, differentiating goods and services and contributing to a better corporate image
Environmental and energy efficiency risks	<p>may be identified as and may be assessed:</p> <ul style="list-style-type: none"> • actual and potential sources of waste • on an ongoing basis • with regard to probability, scale and likely impact on business performance
Environmental and energy efficiency policies and procedures	<p>may include:</p> <ul style="list-style-type: none"> • addressing energy efficiency and environmental initiatives such as environmental management systems, action

	<p>plans, surveys and audits</p> <ul style="list-style-type: none"> • determining company's most appropriate waste treatment including waste to landfill, recycling and wastewater treatment • initiating and/or maintaining appropriate company procedures for operational energy consumption, including stationary energy and non-stationary (transport) • initiating and/or maintaining appropriate company policy for energy efficiency and environmental initiatives, for example environmental management systems, action plans, surveys and audits • developing energy use and waste management options/action plan to reduce energy consumption and improve waste management • monitoring energy usage and waste treatment via progress reports on energy use and waste treatment and/or key performance indicators that measure performance (e.g. energy usage or waste minimisation achievements) • delivering policies and procedures appropriately, for example through internal resources, service providers and/or consultancies
Environmental and energy efficiency management policies	<p>must be appropriate to the scope and scale of the business and may include:</p> <ul style="list-style-type: none"> • environmental load reduction • energy consumption recommendations and waste minimisation and recycling • tenders for the provision of goods and services that specify environmentally preferred selection criteria • protection of land and habitat • environmentally sustainable work practices and energy efficiency initiatives
Environmental and energy efficiency improvement plans	<p>may:</p> <ul style="list-style-type: none"> • be established at management level and may include measuring, monitoring and recording environmental performance, monitoring and recording energy consumption and continually setting targets for measurable improvements. Improvement plans may deal with paper, energy use, general waste, transport use, etc
Supply chain	<ul style="list-style-type: none"> • is a key determinant of environmental and energy efficiency performance and may include suppliers, contractors or others acting on organisation's behalf
Environmental and energy efficiency training	<ul style="list-style-type: none"> • should be integrated into the organisation's existing training arrangements

Evidence Guide

Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and
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	<p>instructions for implementing and monitoring environmental policies</p> <ul style="list-style-type: none"> • implementation of requirements, procedures and techniques for the safe, effective and efficient implementation and monitoring of environmental policies • working with others to plan, prepare, implement and monitor environmental policies • evidence of the consistent successful implementation and monitoring of environmental policies
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • legislation from all levels of government that affects business operation, especially in regard to occupational health and safety, environmental and energy efficiency issues, equal opportunity, industrial relations and anti-discrimination • environmental and energy efficiency issues, especially in regard to recycling and wastewater treatment, catchments, air, noise, ecosystems, habitat, and waste minimisation relevant to own work area • environmental and energy efficiency management systems, policies and procedures relevant to own work area • best practice approaches relevant to own work area • quality assurance systems relevant to own work area • supply chain procedures • strategies to maximise opportunities and minimise impacts relevant to own work area
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply communication/consultation skills to ensure information is supplied to the work team • apply literacy skills for comprehending documentation and interpreting environmental and energy efficiency requirements • apply technology skills, including the ability to operate and shut-down equipment • ability to relate to people from a range of social, cultural and ethnic backgrounds and physical and mental abilities
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and Equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competency may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Mineral Exploration and Development Drilling Level IV	
Unit Title	Implement Operational Plan
Unit Code	MIN EDD4 12 0114
Unit Descriptor	<p>This unit covers skills and knowledge required to implement the operational plan by monitoring and adjusting operational performance, producing short term plans for the department/section, planning and acquiring resources and providing reports on performance as required.</p> <p>At this level, work will normally be carried out within routine and non routine methods and procedures, which require planning, evaluation, leadership and guidance of others.</p>

Elements	Performance Criteria
1. Implement operational plan	<p>1.1. Details of resource requirements are collated, analyzed and organized in consultation with relevant personnel, colleagues and specialist resource managers.</p> <p>1.2. Operational plans are implemented to contribute to the achievement of organization's performance/business plan.</p> <p>1.3. Key Performance Indicators (KPIs) are identified and used to monitor operational performance.</p> <p>1.4. Contingency planning and consultation processes are undertaken.</p> <p>1.5. Assistance in the development and presentation of proposals is provided for resource requirements in line with operational planning processes.</p>
2. Implement resource acquisition	<p>2.1. Employees are recruited and inducted within organization's policies, practices and procedures.</p> <p>2.2. Plans are implemented for acquisition of physical resources and services within organization's policies, practices and procedures and in consultation with relevant personnel.</p>
3. Monitor operational performance	<p>3.1. Performance systems and processes are monitored to assess progress in achieving profit/productivity plans and targets.</p> <p>3.2. Budget and actual financial information is analyzed and used to monitor profit/productivity performance.</p> <p>3.3. Unsatisfactory performance is identified and prompts action taken to rectify the situation according to organizational policies.</p> <p>3.4. Mentoring, coaching and supervision are provided to support individuals and teams to use resources effectively, economically and safely.</p>

	<p>3.5. Recommendations for variation to operational plans are presented to the designated persons/groups and approval is gained.</p> <p>3.6. Systems, procedures and records associated with performance are implemented in accordance with organization's requirements.</p>
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Variable	Range
Resource requirements	<p>may refer to:</p> <ul style="list-style-type: none"> • goods and services to be purchased and ordered • human, physical and financial resources - both current and projected • stock requirements and requisitions
Relevant personnel, colleagues and specialist resource managers	<p>may include:</p> <ul style="list-style-type: none"> • colleagues and specialist resource managers • managers • occupational health and safety committees and other people with specialist responsibilities • other employees • people from a wide range of social, cultural and ethnic backgrounds, and people with a range of physical and mental abilities • supervisors
Operational plans	<p>may refer to:</p> <ul style="list-style-type: none"> • organisational plans • tactical plans developed by the department or section to detail product and service performance
Key performance indicators (KPIs)	<p>may refer to:</p> <ul style="list-style-type: none"> • measures for monitoring or evaluating the efficiency or effectiveness of a system, and which may be used to demonstrate accountability and to identify areas for improvements
Contingency planning	<p>may refer to:</p> <ul style="list-style-type: none"> • contracting out or outsourcing human resources 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 organisation to reduce labour costs • risk identification, assessment and management processes • seeking further funding • strategies for reducing costs, wastage, stock or consumables and succession planning

Consultation processes	<p>may refer to:</p> <ul style="list-style-type: none"> 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
Organisation's policies, practices and procedures	<p>may include:</p> <ul style="list-style-type: none"> organisational culture Standard Operating Procedures organisational guidelines which govern and prescribe operational functions, such as the acquisition and management of human and physical resources undocumented practices in line with organisational operations
Performance systems and processes	<p>may refer to:</p> <ul style="list-style-type: none"> informal systems used by frontline managers for the work team in the place of existing organisation-wide systems formal processes within the organisation to measure performance, such as: <ul style="list-style-type: none"> feedback arrangements individual and teamwork plans KPIs specified work outcomes
Designated persons/groups	<p>may include:</p> <ul style="list-style-type: none"> other affected work groups or teams and groups designated in workplace policies and procedures those who have the authority to make decisions and/or recommendations about operations such as workplace supervisors, other managers
Systems, procedures and records	<p>may include:</p> <ul style="list-style-type: none"> databases and other recording mechanisms for ensuring records are kept in accordance with organisational requirements individual and team performance plans organisational policies and procedures relative to performance

Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to/of:</p> <ul style="list-style-type: none"> monitor and adjust operational performance, produce short-term plans for the department or section, plan and acquire resources, and provide reports on performance as required knowledge of principles and techniques associated with monitoring and implementing operations and procedures
Underpinning Knowledge and	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> principles and techniques associated with:

Attitudes	<ul style="list-style-type: none"> ➤ contingency planning ➤ methods for monitoring and reporting on performance ➤ monitoring and implementing operations and procedures ➤ problem identification and methods of resolution ➤ relevant budgeting and financial analysis, interpretation and reporting requirements ➤ resource management systems at the tactical implementation level ➤ resource planning and acquisition ➤ tactical risk analysis including identification and reporting requirements.
Underpinning Skills	<p>Demonstrate skills of:</p> <ul style="list-style-type: none"> • coaching and mentoring skills to provide support to colleagues • literacy skills to access and use workplace information, and to prepare reports • planning and organising skills to monitor performance and to sequence work of self and others to achieve planned outcomes.
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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level IV	
Unit Title	Plan and Supervise the Mobilization of Equipment, Crew and Materials
Unit Code	MIN EDD4 13 0114
Unit Descriptor	This unit covers planning and supervision of the mobilisation of equipment, crew and materials in the drilling industry. It includes planning and preparing for mobilisation, planning hazard control procedures, selecting and sourcing equipment, services and supplies needed, initiating the mobilisation of the job, and monitoring mobilisation (including loading) and responding to problems. This unit is appropriate for those working in a supervisory role or as a technical specialist, at worksites within: Drilling.

Elements	Performance Criteria
1. Plan and prepare for mobilization	<p>1.1. Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2. Work instructions are obtained, confirmed and applied for the allocated task.</p> <p>1.3. All potential hazards are identified, managed and reported.</p> <p>1.4. Coordination requirements are resolved with others at the site prior to commencing and during work activities.</p> <p>1.5. Drilling plan details are confirmed with appropriate personnel/client.</p> <p>1.6. Plan is documented and communicated to relevant people.</p>
2. Plan hazard control procedures	<p>2.1. Job and site hazards and risks are identified.</p> <p>2.2. The nature, location and scope of hazard and/or risk are assessed.</p> <p>2.3. Site/job specific procedures are determined for managing hazards and risks.</p> <p>2.4. Hazard control procedures are confirmed with relevant people.</p> <p>2.5. Hazard control procedures are documented and communicated to relevant people.</p>
3. Select and source equipment, services and supplies needed	<p>3.1. Appropriate rig(s) and components are selected for the job.</p> <p>3.2. Supplies, amenities and other consumables required for the job are selected.</p> <p>3.3. Required support plant/equipment/vehicles are selected for the job and serviceability is confirmed.</p>

	<p>3.4. Crew is selected for the job.</p> <p>3.5. Checklists are developed for all required equipment, supplies and personnel.</p> <p>3.6. Selections and checklists are checked against agreed plan.</p>
4. Initiate the mobilization of the job	<p>4.1. The appointment of the crew is appointed/organized.</p> <p>4.2. The induction of the crew to the job is organized.</p> <p>4.3. Checklists are distributed to appropriate people.</p> <p>4.4. Availability of all required items is confirmed.</p> <p>4.5. Maintenance/service has been completed for all equipment/plant.</p> <p>4.6. Job requirements and checklists are clarified with recipients of checklists.</p> <p>4.7. Accommodation and finance arrangements are organized/confirmed.</p>
5. Monitor mobilization (including loading) and respond to problems	<p>5.1. Mobilization is monitored.</p> <p>5.2. Possible problems are identified.</p> <p>5.3. Problems needing action are determined.</p> <p>5.4. Possible fault causes are determined.</p> <p>5.5. Problem is rectified using appropriate solution within area of responsibility.</p> <p>5.6. Problems outside area of responsibility are reported to designated person.</p> <p>5.7. Items initiated are followed until final resolution has occurred.</p>

Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organisational and site requirements and procedures including: <ul style="list-style-type: none"> ➢ drilling program ➢ contract ➢ other relevant information • manufacturer's guidelines and specifications • Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Work instructions	<p>may come from briefings, handovers, plans and work orders and may be written or verbal, formal or informal and may include:</p>

	<ul style="list-style-type: none"> • determination of location and geology of planned drill holes • determination of social, heritage and environmental issues • selection of appropriate drilling method and equipment for job • estimation of likely travel duration/methods for job • estimation of likely duration of job • development/review of budget (dollars, equipment, supplies, consumables, accommodation and people) for job • drafting a plan for the drilling job • nature and scope of tasks • specifications • quality of finished works • achieved targets • operational conditions • obtaining of required permits • site layout • out of bounds areas • worksite inspection requirements • lighting conditions • plant of equipment defects • coordination requirements or issues • contamination control requirements • environmental control requirements • barricade and signage requirements
Hazards	<p>may include:</p> <ul style="list-style-type: none"> • working in proximity to drilling rig • site hazards (e.g. access and egress) • geological hazards (e.g. unstable formations) • specific hazards (e.g. pressure, hot water, contaminated land)
Coordination requirements	<p>may include:</p> <ul style="list-style-type: none"> • other equipment operators • maintenance personnel • supervisors • site personnel
Drilling plan	<p>may include:</p> <ul style="list-style-type: none"> • location of bore(s) • geology of area • preferred method(s) of drilling, drill fluids • equipment, consumables and people required for the job, and the associated dollars • particular issues (e.g. heritage, social, Indigenous and environmental)
Equipment and supplies	<p>may include:</p> <ul style="list-style-type: none"> • company owned equipment • purchased supplies/tools/small equipment • leased equipment

Problems	<p>may include:</p> <ul style="list-style-type: none"> • rig/crew unavailable • mobilisation delayed • bad weather
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Evidence Guide	
Critical aspects of Competence	<p>must confirm appropriate knowledge and skills to:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions for planning and supervision of the mobilisation of equipment, crew and materials • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of planning and supervision of the mobilisation of equipment, crew and materials • working with others to plan and supervise the mobilisation of equipment, crew and materials • evidence of the consistent successful planning and supervision of the mobilisation of equipment, crew and materials
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • geology and its impact on drill requirements • relative benefits/limitations of different methods of drilling • relative benefits/limitations of different rigs • strengths and weaknesses of crews • heritage and environmental requirements • budgeting procedures • equipment selection criteria
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures for planning and supervision of the mobilisation of equipment, crew and materials • reading and writing • verbal communication • team leadership and organisational skills • report on checklist preparation • observation skills
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and Equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competency may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Mineral Exploration and Development Drilling Level IV	
Unit Title	Monitor a Safe Workplace
Unit Code	MIN EDD4 14 0114
Unit Descriptor	<p>This unit describes the performance outcomes, skills and knowledge required to implement and monitor the organisation's Occupational Health and Safety (OHS) policies, procedures and programs in the relevant work area to meet legislative requirements. This unit applies to employees with supervisory responsibilities for implementing and monitoring the organisation's OHS policies, procedures and programs in a work area.</p> <p>This unit applies to individuals with a broad knowledge of OHS policies who contribute well developed skills in creating solutions to unpredictable problems through analysis and evaluation of information from a variety of sources. They provide supervision and guidance to others and have limited responsibility for the output of others.</p>

Elements	Performance Criteria
1. Provide information to the workgroup about OHS policies and procedures	<p>1.1. Relevant provisions of OHS legislation and codes of practice are accurately explained to the workgroup.</p> <p>1.2. Information is provided to the workgroup on the organization's OHS policies, procedures and programs, ensuring it is readily accessible by the workgroup.</p> <p>1.3. Information about identified hazards and the outcomes of risk assessment is regularly provided and clearly explained and controlled to the workgroup.</p>
2. Implement and monitor participative arrangements for the management of OHS	<p>2.1. The importance of effective consultative mechanisms is explained in managing health and safety risks.</p> <p>2.2. Consultative procedures are implemented and monitored to facilitate participation of workgroup in management of work area hazards.</p> <p>2.3. Issues raised are promptly dealt through consultation, in accordance with organizational consultation procedures.</p> <p>2.4. The outcomes of consultation over OHS issues are promptly recorded and communicated to the workgroup.</p>
3. Implement and monitor the organization's procedures for providing OHS training	<p>3.1. OHS training needs are systematically identified in line with organizational requirements.</p> <p>3.2. Arrangements are made to meet OHS training needs of team members in consultation with relevant individuals.</p> <p>3.3. Workplace learning opportunities, coaching and mentoring assistance are provided to facilitate team and individual achievement of identified training needs.</p> <p>3.4. The costs associated with providing training for work team, for inclusion in financial plans are identified and reported to management.</p>

4. Implement and monitor procedures for identifying hazards and assessing risks	<p>4.1. Hazards in work area are identified and reported in accordance with OHS policies and procedures.</p> <p>4.2. Team member hazard reports are implemented in accordance with organizational procedures.</p>
5. Implement and monitor the organization's procedures for controlling risks	<p>5.1. Procedures to control risks are implemented using the hierarchy of controls and organizational requirements.</p> <p>5.2. Inadequacies in existing risk control measures are identified and reported in accordance with the hierarchy of controls.</p> <p>5.3. Outcomes of reported inadequacies are monitored, where appropriate, to ensure a prompt organizational response.</p>
6. Implement and monitor the organization's procedures for maintaining OHS records for the team	<p>6.1. OHS records of incidents of occupational injury and disease in work area are accurately completed and maintained in accordance with OHS legal requirements.</p> <p>6.2. Aggregate information and data from work area records are used to identify hazards and monitor risk control procedures in work area.</p>

Variable	Range
OHS legislation and codes of practice	<p>may include:</p> <ul style="list-style-type: none"> • common law duties to meet the general duty of care requirements • health and safety representatives and health and safety committees • prompt resolution of health and safety issues • provision of information, induction and training • regulations and approved codes of practice relating to hazards present in work area • relevant legislation • requirements for the maintenance and confidentiality of records of occupational injury and disease
Organisation's OHS policies, procedures and programs	<p>may include:</p> <ul style="list-style-type: none"> • consultative arrangements for employees in work area • dangerous goods transport and storage • emergency and evacuation procedures • first aid provision/medical practitioner contact and attention • hazard reporting procedures • hazardous substances use and storage • incident (accident) investigation • OHS arrangements for on site contractors, visitors and members of public • OHS audits and safety inspections • plant and equipment maintenance and use • procedures for hazard identification • procedures for risk assessment, selection and implementation of risk control measures

	<ul style="list-style-type: none"> • purchasing policy and procedures • safe operating procedures/instructions • site access • use and care of personal protective equipment 		
Identified hazards and the outcomes of risk assessment	<p>may include:</p> <ul style="list-style-type: none"> • checking equipment before and during work • consulting work team members • daily informal employee consultation and regular formal employee meetings • housekeeping • OHS audits and review of audit reports • review of health and safety records including hazard reports, hazardous substances and dangerous goods registers, injury records • workplace inspections in area of responsibility 		
Organisational consultation procedures	<p>may include:</p> <ul style="list-style-type: none"> • attendance of health and safety representatives at management and OHS planning meetings • counseling/disciplinary processes • early response to employee suggestions, requests, reports and concerns put forward to management • election of health and safety representatives in accordance with legislative requirements • formal and informal meetings • health and safety committees • other committees, for example, planning and purchasing 		
Procedures to control risks	<p>may include:</p> <ul style="list-style-type: none"> • consultation with employees and their representatives • job/process/workplace re-design e.g. introduce mechanical handling equipment, re-arrange material flow/timing/scheduling, raise/lower work platforms • removing the cause of a risk at its source (eliminating the hazard) e.g. removing stored goods permanently from emergency exit passageways • selecting control measures in accordance with the hierarchy i.e. work through hierarchy from most effective to least effective control 		
OHS records	<p>may include:</p> <ul style="list-style-type: none"> • audit and inspection reports • consultation e.g. meetings of health & safety committees, workgroup meeting agendas including OHS items and actions • first aid/medical post records • hazardous substances registers • induction, instruction and training • manufacturer's and supplier's information including dangerous goods storage lists • plant and equipment maintenance and testing reports • workers compensation and rehabilitation records • workplace environmental monitoring records 		
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Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • applying organisational management systems and procedures to OHS within workgroup area • applying procedures for assessing and controlling risks to health and safety associated with those hazards, in accordance with the hierarchy of controls • providing specific, clear and accurate information and advice on workplace hazards to workgroup • knowledge of legal responsibilities of employers, supervisors and employees in the workplace.
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • key provisions of relevant legislation from all levels of government that may affect aspects of business operations, such as: <ul style="list-style-type: none"> ➢ anti-discrimination legislation ➢ ethical principles ➢ codes of practice ➢ privacy laws ➢ environmental issues ➢ OHS • legal responsibilities of employers, supervisors and employees in the workplace • hazards and associated risks which exist in the workplace • organisational policies and procedures relating to hazard management, fire, emergency, evacuation, incident (accident) investigating and reporting • relevance of consultation as a key mechanism for improving workplace culture.
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • analytical skills to identify hazards, to assess risks in the work area and to review data relating to monitoring and evaluating incidents (accidents), environmental issues and the effectiveness of risk control measures • literacy skills to comprehend documentation and to interpret OHS requirements • coaching and mentoring skills to provide support to colleagues.
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and Equipment, and to information on workplace practices and OHS practices.</p>
Assessment Methods	<p>Competency may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test / Oral Questioning • Observation / Demonstration
Context of Assessment	<p>Competency may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Mineral Exploration and Development Drilling Level IV	
Unit Title	Plan and Organize Work
Unit Code	MIN EDD4 15 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	<p>1.1 Objectives are planned consistent with and linked to work activities in accordance with organizational aims.</p> <p>1.2 Objectives are stated as measurable targets with clear time frames.</p> <p>1.3 Support and commitment of team members are reflected in the objectives.</p> <p>1.4 Realistic and attainable objectives are identified.</p>
2. Plan and schedule work activities	<p>2.1 Tasks/work activities to be completed are identified and prioritized as directed.</p> <p>2.2 Tasks/work activities are broken down into steps in accordance with set time frames and achievable components.</p> <p>2.3 Task/work activities are assigned to appropriate team or individuals in accordance with agreed functions.</p> <p>2.4 Resources are allocated as per requirements of the activity.</p> <p>2.5 Schedule of work activities is coordinated with personnel concerned.</p>
3. Implement work plans	<p>3.1 Work methods and practices are identified in consultation with personnel concerned.</p> <p>3.2 Work plans are implemented in accordance with set time frames, resources and standards.</p>
4. Monitor work activities	<p>4.1 Work activities are monitored and compared with set objectives.</p> <p>4.2 Work performance is monitored.</p> <p>4.3 Deviations from work activities are reported and recommendations are coordinated with appropriate personnel and in accordance with set standards.</p> <p>4.4 Reporting requirements are complied with in accordance with recommended format.</p> <p>4.5 Timeliness of report is observed.</p> <p>4.6 Files are established and maintained in accordance with standard operating procedures.</p>

5. Review and evaluate work plans and activities	<p>5.1 Work plans, strategies and implementation are reviewed based on accurate, relevant and current information.</p> <p>5.2 Review is done based on comprehensive consultation with appropriate personnel on outcomes of work plans and reliable feedback.</p> <p>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.</p> <p>5.4 Performance appraisal is conducted in accordance with organization rules and regulations.</p> <p>5.5 Performance appraisal report is prepared and documented regularly as per organization requirements.</p> <p>5.6 Recommendations are prepared and presented to appropriate personnel/authorities.</p> <p>5.7 Feedback mechanisms are implemented in line with organization policies.</p>
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Variable	Range
Objectives	May include but not limited to: <ul style="list-style-type: none"> • Specific • General
Resources	May include but not limited to: <ul style="list-style-type: none"> • Personnel • Equipment and technology • Services • Supplies and materials • Sources for accessing specialist advice • Budget
Schedule of work activities	May include but not limited to: <ul style="list-style-type: none"> • Daily • Work-based • Contractual • Regular
Work methods and practices	May include but not limited to: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • Daily work plans • Project plans • Program plans • Resource plans • Skills development plans • Management strategies and objectives
Standards	May include but not limited to: <ul style="list-style-type: none"> • Performance targets

	<ul style="list-style-type: none"> • 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	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Appropriate personnel include: • Management • Line Staff
Feedback mechanisms	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Verbal feedback • Informal feedback • Formal feedback • Questionnaire • Survey and Group discussion

Evidence Guide

Critical Aspects of Competence	<p>Demonstrates skills and knowledge to:</p> <ul style="list-style-type: none"> • set objectives • plan and schedule work activities • implement and monitor work plans and work activities • review and evaluate work plans and activities
Underpinning Knowledge and Attitudes	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • 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	<p>Demonstrates skill to:</p> <ul style="list-style-type: none"> • plan • lead • organize • coordinate • communicate • inter-and intra-person/motivation skills and present
Resource Implications	<p>Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competence may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Mineral Exploration and Development Drilling Level IV	
Unit Title	Migrate to New Technology
Unit Code	MIN EDD4 16 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	<p>1.1 Situations are identified where existing knowledge can be used as the basis for developing new skills.</p> <p>1.2 New or upgraded technology skills are acquired and used to enhance learning.</p> <p>1.3 New or upgraded equipment are identified, classified and used where appropriate, for the benefit of the organization.</p>
2. Apply functions of technology to assist in solving organizational problems	<p>2.1 Testing of new or upgraded equipment is conducted according to the specification manual.</p> <p>2.2 Features of new or upgraded equipment are applied within the organization</p> <p>2.3 Features and functions of new or upgraded equipment are used for solving organizational problems</p> <p>2.4 Sources of information relating to new or upgraded equipment are accessed and used</p>
3. Evaluate new or upgraded technology performance	<p>3.1 New or upgraded equipment is evaluated for performance, usability and against OHS standards.</p> <p>3.2 Environmental considerations are determined from new or upgraded equipment.</p> <p>3.3 Feedback is sought from users where appropriate.</p>

Variables	Range
Environmental Considerations	<p>May include but is not limited to:</p> <ul style="list-style-type: none"> recycling, safe disposal of packaging (e.g. cardboard, polystyrene, paper, plastic) and correct disposal of waste materials by an authorized body
Feedback	<p>May include but is not limited to:</p> <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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	Competence may be assessed through: <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level IV	
Unit Title	Establish Quality Standards
Unit Code	MIN EDD4 17 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	<p>1.1 Market specifications are sourced and legislated requirements identified.</p> <p>1.2 Quality specifications are developed and agreed upon.</p> <p>1.3 Quality specifications are documented and introduced to organization staff / personnel in accordance with the organization policy.</p> <p>1.4 Quality specifications are updated when necessary.</p>
2. Identify hazards and critical control points	<p>2.1 Critical control points impacting on quality are identified.</p> <p>2.2 Degree of risk for each hazard is determined.</p> <p>2.3 Necessary documentation is accomplished in accordance with organization quality procedures.</p>
3. Assist in planning of quality assurance procedures	<p>3.1 Procedures for each identified control point are developed to ensure optimum quality.</p> <p>3.2 Hazards and risks are minimized through application of appropriate controls.</p> <p>3.3 Processes are developed to monitor the effectiveness of quality assurance procedures.</p>
4. Implement quality assurance procedures	<p>4.1 Responsibilities for carrying out procedures are allocated to staff and contractors.</p> <p>4.2 Instructions are prepared in accordance with the enterprise's quality assurance program.</p> <p>4.3 Staff and contractors are given induction training on the quality assurance policy.</p> <p>4.4 Staff and contractors are given in-service training relevant to their allocated safety procedures.</p>
5. Monitor quality of work outcome	<p>5.1 Quality requirements are identified.</p> <p>5.2 Inputs are inspected to confirm capability to meet quality requirements.</p> <p>5.3 Work is conducted to produce required outcomes.</p> <p>5.4 Work processes are monitored to confirm quality of output and/or service.</p>

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

Variable	Range
Sourced	<p>May include but is not limited to:</p> <ul style="list-style-type: none"> • End-users • Customers or stakeholders
Legislated requirements	<p>May include but is not limited to:</p> <ul style="list-style-type: none"> • Verification of product quality as part of consumer legislation or specific legislation related to product content or composition.
Safety procedures.	<p>May include but is not limited to:</p> <ul style="list-style-type: none"> • 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	<p>Demonstrates skills and knowledge to:</p> <ul style="list-style-type: none"> • 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	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • work and product quality specifications • quality policies and procedures • improving quality at work

	<ul style="list-style-type: none"> • hazards and critical points of operation • obtaining and using information • applying federal and regional legislation within day-to-day work activities • accessing and using management systems to keep and maintain accurate records • requirements for correct preparation and operation • technical writing
Underpinning Skills	<p>Demonstrates skills to:</p> <ul style="list-style-type: none"> • 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
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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level IV	
Unit Title	Develop Individuals and Team
Unit Code	MIN EDD4 18 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	<p>1.1 Learning and development needs are systematically identified and implemented in line with organizational requirements.</p> <p>1.2 Learning plan to meet individual and group training and developmental needs is collaboratively developed and implemented.</p> <p>1.3 Individuals are encouraged to self-evaluate performance and identify areas for improvement.</p> <p>1.4 Feedback on performance of team members is collected from relevant sources and compared with established team learning process.</p>
2. Foster individual and organizational growth	<p>2.1 Learning and development program goals and objectives are identified to match the specific knowledge and skills requirements of Competence standards.</p> <p>2.2 Learning delivery methods are made appropriate to the learning goals, the learning style of participants and availability of equipment and resources.</p> <p>2.3 Workplace learning opportunities and coaching/ mentoring assistance are provided to facilitate individual and team achievement of competencies.</p> <p>2.4 Resources and timelines required for learning activities are identified and approved in accordance with organizational requirements.</p>
3. Monitor and evaluate workplace learning	<p>3.1 Feedback from individuals or teams is used to identify and implement improvements in future learning arrangements.</p> <p>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.</p> <p>3.3 Modifications to learning plans are negotiated to improve the efficiency and effectiveness of learning.</p> <p>3.4 Records and reports of competence are maintained within organizational requirement.</p>

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

Variable	Range
Learning and development needs	<p>May include but is not limited to:</p> <ul style="list-style-type: none"> • 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	<p>May include but is not limited to:</p> <ul style="list-style-type: none"> • 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	<p>May include but is not limited to:</p> <ul style="list-style-type: none"> • 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	<p>May include but is not limited to:</p> <ul style="list-style-type: none"> • 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	<p>Demonstrates skills and knowledge to:</p> <ul style="list-style-type: none"> • 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	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • 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	<p>Demonstrates skills to:</p> <ul style="list-style-type: none"> • read and understand 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 • communicate including receiving feedback and reporting, maintaining effective relationships and conflict management • plan and organize required resources and equipment to meet learning needs • coach and mentor skills to provide support to colleagues • report to organize information; assess information for relevance and accuracy; identify and elaborate on learning outcomes • facilitate and conduct small group training sessions • relate to people from a range of social, cultural, physical and mental backgrounds
Resource Implications	<p>Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competence may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Mineral Exploration and Development Drilling Level IV	
Unit Title	Utilize Specialized Communication Skills
Unit Code	MIN EDD4 19 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.	<p>1.1 Specific communication needs of clients and colleagues are identified and met.</p> <p>1.2 Different approaches are used to meet communication needs of clients and colleagues.</p> <p>1.3 Conflict is addressed promptly and in a timely way and in a manner which does not compromise the standing of the organization.</p>
2. Contribute to the development of communication strategies.	<p>2.1 Strategies for internal and external dissemination of information are developed, promoted, implemented and reviewed as required.</p> <p>2.2 Channels of communication are established and reviewed regularly.</p> <p>2.3 Coaching in effective communication is provided.</p> <p>2.4 Work related network and relationship are maintained as necessary.</p> <p>2.5 Negotiation and conflict resolution strategies are used where required.</p> <p>2.6 Communication with clients and colleagues is appropriate to individual needs and organizational objectives.</p>
3. Represent the organization.	<p>3.1 When participating in internal or external fora, presentation is relevant, appropriately researched and presented in a manner to promote the organization.</p> <p>3.2 Presentation is made clear and sequential and delivered within a predetermined time.</p> <p>3.3 Appropriate media is utilized to enhance presentation.</p> <p>3.4 Differences in views are respected.</p> <p>3.5 Written communication is made consistent with organizational standards.</p> <p>3.6 Inquiries are responded in a manner consistent with organizational standard.</p>

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

Variable	Range
Strategies	May include but is not limited to: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • Related to staff issues

	<ul style="list-style-type: none"> • Routine • Confidential • Evidential • Non-disclosure • Disclosure
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Evidence Guide	
Critical Aspects of Competence	Demonstrates skills and knowledge to: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • communication process • dynamics of groups and different styles of group leadership • communication skills relevant to client groups
Underpinning Skills	Demonstrates skills to: <ul style="list-style-type: none"> • full range of communication techniques including: <ul style="list-style-type: none"> ➤ active listening ➤ feedback ➤ interpretation ➤ role boundaries setting ➤ negotiation ➤ establishing empathy ➤ communication strategies • communicate 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: <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level IV	
Unit Title	Manage and Maintain Small/Medium Business Operations
Unit Code	<u>MIN EDD4 20 0114</u>
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	<p>1.1 Work requirements are identified for a given time period by taking into consideration resources and constraints.</p> <p>1.2 Work activities are prioritized based on business needs, requirements and deadlines.</p> <p>1.3 If appropriate, work is allocated to relevant staff or contractors to optimize efficiency.</p>
2. Monitor and manage work	<p>2.1 People, resources and/or equipment are coordinated to provide optimum results.</p> <p>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.</p> <p>2.3 Problem solving techniques are applied to work situations to overcome difficulties and achieve positive outcomes.</p>
3. Develop effective work habits	<p>3.1 Work and personal priorities are identified and a balance is achieved between competing priorities using appropriate time management strategies.</p> <p>3.2 Input from internal and external sources is sought and used to develop and refine new ideas and approaches.</p> <p>3.3 Business or inquiries is/are responded to promptly and effectively.</p> <p>3.4 Information is presented in a format appropriate to the industry and audience.</p>
4. Interpret financial information	<p>4.1 Relevant documents and reports are identified.</p> <p>4.2 Documents and reports are read and understood and any implications discussed with appropriate persons.</p> <p>4.3 Data and numerical calculations are analyzed, checked, evaluated, organized and reconciled.</p> <p>4.4 Daily financial records and cash flow are maintained correctly and in accordance with legal and accounting requirements.</p> <p>4.5 Invoices and payments are prepared and distributed in a timely manner and in accordance with legal requirements.</p>

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

Variable	Range
Resources	<p>May include but is not limited to:</p> <ul style="list-style-type: none"> • staff • money • time • equipment • space
Business goals	<p>May include but is not limited to:</p> <ul style="list-style-type: none"> • sales targets • budgetary targets • team and individual goals • production targets and reporting deadlines
Problem solving techniques	<p>May include but is not limited to:</p> <ul style="list-style-type: none"> • 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	<p>May include but is not limited to:</p> <ul style="list-style-type: none"> • 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 external sources	<p>May include but is not limited to:</p> <ul style="list-style-type: none"> • 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	<p>A person must be able to demonstrate:</p> <ul style="list-style-type: none"> • ability to identify daily work requirements and allocate work appropriately • ability to interpret financial documents in accordance with legal requirements
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • 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	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • interpret legal requirements, company policies and procedures and immediate, day-to-day demands • communicate using 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 • relate to people from a range of social, cultural and ethnic backgrounds and physical and mental abilities • solve problem and develop contingency plans • using computers and software packages to record and manage data and to produce reports • evaluate using assessment work and outcomes • observe for identifying appropriate people, resources and to monitor work
Resource Implications	<p>Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competence may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Mineral Exploration and Development Drilling Level IV	
Unit Title	Apply Problem Solving Techniques and Tools
Unit Code	MIN EDD4 21 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.	<p>1.1 Safety requirements are followed in accordance with safety plans and procedures.</p> <p>1.2 All possible problems related to the process /Kaizen elements are listed using statistical tools and techniques.</p> <p>1.3 All possible problems related to kaizen elements are identified and listed on Visual Management Board/Kaizen Board.</p> <p>1.4 Problems are classified based on obviousness of cause and action.</p> <p>1.5 Critical factors like the number of customers affected, Potentials for bottlenecks, and number of complaints etc... is selected.</p> <p>1.6 Problems related to priorities of Kaizen Elements are given due emphasis and selected.</p>
2. Grasp current status and set goal.	<p>2.1 The extent of the problem is defined.</p> <p>2.2 Appropriate and achievable goal is set.</p>
3. Establish activity plan.	<p>3.1 The problem is confirmed.</p> <p>3.2 High priority problem is selected.</p> <p>3.3 The extent of the problem is defined.</p> <p>3.4 Activity plan is established as per 5W1H.</p>
4. Analyze causes of a problem.	<p>4.1 All possible causes of a problem are listed.</p> <p>4.2 Cause relationships are analyzed using 4M1E.</p> <p>4.3 Causes of the problems are identified.</p> <p>4.4 Root causes are selected.</p> <p>4.5 The root cause which is most directly related to the problem is selected.</p> <p>4.6 All possible ways are listed using creative idea generation to eliminate the most critical root cause.</p> <p>4.7 The suggested solutions are carefully tested and evaluated for potential complications.</p> <p>4.8 Detailed summaries of the action plan are prepared to</p>

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

Variables	Range
Safety requirements	<p>may include but not limited to:</p> <ul style="list-style-type: none"> • 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	<p>may include but not limited to:</p> <ul style="list-style-type: none"> • 7 QC tools may include: <ul style="list-style-type: none"> ➢ Stratification ➢ Pareto Diagram ➢ Cause and Effect Diagram ➢ Check Sheet ➢ Control Chart/Graph ➢ Histogram ➢ Scatter Diagram • QC techniques may include: <ul style="list-style-type: none"> ➢ Brain storming ➢ Why analysis ➢ What if analysis ➢ 5W1H
Kaizen Elements	<p>may include but not limited to:</p> <ul style="list-style-type: none"> • Quality • Cost • Productivity • Delivery • Safety • Moral • Environment • Gender equality

5W1H	<p>may include but not limited to:</p> <ul style="list-style-type: none"> • Who: person in charge • Why: objective • What: item to be implemented • Where: location • When: time frame • How: method
4M1E	<p>may include but not limited to:</p> <ul style="list-style-type: none"> • Man • Machine • Method • Material and • Environment
Creative idea generation	<p>may include but not limited to:</p> <ul style="list-style-type: none"> • Brainstorming • Exploring and examining ideas in varied ways • Elaborating and extrapolating • Conceptualizing
Medium KPT	<p>may include but not limited to:</p> <ul style="list-style-type: none"> • 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	<p>may include but not limited to:</p> <ul style="list-style-type: none"> • Tangible result may include: <ul style="list-style-type: none"> ➢ Quantifiable data • Intangible result may include: <ul style="list-style-type: none"> ➢ Qualitative data
Various types of diagram	<p>may include but not limited to:</p> <ul style="list-style-type: none"> • Line graph • Bar graph • Pie-chart • Scatter diagram • Affinity diagram
Standard Operating Procedures (SOPs)	<p>may include but not limited to:</p> <ul style="list-style-type: none"> • 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	<p>Demonstrates skills and knowledge competencies to:</p> <ul style="list-style-type: none"> • 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.
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	<ul style="list-style-type: none"> • Implement and monitor improved practices and procedures • Apply statistical quality control tools and techniques.
Underpinning Knowledge and Attitude	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • 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	<p>Demonstrates skills to:</p> <ul style="list-style-type: none"> • 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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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 V

Occupational Standard: Mineral Exploration and Development Drilling Level V	
Unit Title	Plan Drilling
Unit Code	MIN EDD5 01 0114
Unit Descriptor	This unit covers the planning of drilling programs in the drilling industry. It includes: liaising with clients and other relevant parties; inspect and researching site for accessibility, services, hazards, legal and environmental problems; selecting appropriate drilling methods, preparing cost estimates, quotes and tenders; arranging permits and licences; designing and organising drilling programs; and preparing occupational health and safety plans for sites. This unit is appropriate for those working in management or technical specialist roles within: Drilling.

Elements	Performance Criteria
1. Liaise with clients and other relevant parties	<p>1.1. Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2. Precise scope of work expected is defined by client and other relevant parties.</p> <p>1.3. Communication is conducted with all parties clearly and concisely to ensure that priorities and special requirements are understood and acted upon.</p> <p>1.4. An achievable and acceptable contract is negotiated with the client within the scope of the driller's legal requirements and legal responsibilities.</p> <p>1.5. Agreement on the drilling plan is achieved and documented by communicating and clarifying intended objectives and contract requirements with all relevant parties.</p> <p>1.6. A time schedule is developed for all operations.</p>
2. Inspect/research site for accessibility, services, hazards, legal and environmental problems	<p>2.1. Size and nature of intended drill sites and designated routes are established to reach them.</p> <p>2.2. Topographical and geological features are assessed and preferred drilling sites identified.</p> <p>2.3. Specific relevant information is located and interpreted from maps, diagrams or from other data.</p> <p>2.4. Legal and environmental limitations, and hazards applying to site are identified and appropriate action is taken.</p> <p>2.5. Locations of socially or environmentally sensitive areas are identified and honored according to the site agreement.</p> <p>2.6. Availability and distance of water and/or other local supplies are checked.</p>

3. Select appropriate drilling method	<p>3.1. Available data relevant to ground conditions is read and evaluates.</p> <p>3.2. Optimum method of drilling and down hole tools is selected in consultation with other personnel.</p>		
4. Prepare cost estimates, quotes and tenders	<p>4.1. Data is prepared for quote listing all necessary activities, materials and sub-contracting services needed.</p> <p>4.2. A contingency sum is allowed for identifiable but uncertain factors.</p> <p>4.3. Mathematical calculations and estimations are used to determine job costs.</p> <p>4.4. Quote/tender is presented clearly.</p>		
5. Arrange permits and licenses	<p>5.1. The required permits and licenses are determined and obtained.</p> <p>5.2. Correct application procedures are followed.</p>		
6. Design and organize drilling program	<p>6.1. Action plan is established to ensure completion of program to client satisfaction, within quality, time and cost parameters.</p> <p>6.2. Scope of work is communicated to crew involved in drilling program.</p> <p>6.3. Fieldwork instructions, detailing: project location, access, water supply, aims of project and detailed instructions are prepared.</p> <p>6.4. Variations to scope of work/contractual requirements on log are noted.</p> <p>6.5. Appropriate and available crew and other resources are selected for the job.</p> <p>6.6. Job requirements, working conditions and role and responsibilities are communicated clearly and concisely with crew(s) and if ambiguity occurs immediately clarified.</p> <p>6.7. Size and nature of intended drill rig sites, and routes are established for reaching them.</p> <p>6.8. Track, clearing or bench construction sizes and compaction required to support rigs and equipment are specified any accessed.</p> <p>6.9. Availability of site amenities and back up support are clarified.</p> <p>6.10. Decide upon methods of controlling flow off site, disposing of wastes and restoring the site after the operations.</p>		
7. Prepare OHS plan for site	<p>7.1. Plan is prepared to eliminate/mitigate hazards to designated level.</p> <p>7.2. Signs, hazards and warnings and understand</p>		
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	<p>consequences are read and followed.</p> <p>7.3. Required safety equipment is determined and acquired</p> <p>7.4. Safety rules and regulations, legislation and specific site instructions are incorporated.</p> <p>7.5. Sign-off on commitment to Occupational Health and Safety (OHS) plan is obtained from crew.</p>
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Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organisational and site requirements and procedures • manufacturer's guidelines and specifications • Relevant Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Scope of work	<p>may include:</p> <ul style="list-style-type: none"> • tendering/quoting • site inspections • liaising with clients • crew selection/training • purchase/acquisition of equipment
Relevant parties	<p>may include:</p> <ul style="list-style-type: none"> • landholders • geologists • engineers • drilling crews • government departments • utility providers
Communication	<p>may include:</p> <ul style="list-style-type: none"> • face to face • telephone • 2-way radio • written documentation • SAT phones
Legal requirements	<p>may include:</p> <ul style="list-style-type: none"> • environmental protection • groundwater protection • licensing • occupational health and safety
Legal responsibilities	<p>may include:</p> <ul style="list-style-type: none"> • notice to the licensing body of intention to start work on hole or well, or in certain areas • provision of dates when drilling would be in progress • provision of statutory records and samples by due date

Topographical and geological features	<p>may be determined by various methods, including:</p> <ul style="list-style-type: none"> • geological and topographical maps • air photos, photogrammetric methods generally • site inspection (foot, 2- or all wheel drive)
Relevant information	<p>may include:</p> <ul style="list-style-type: none"> • maps (e.g. road, geological and topographical maps, site mud maps) • surveys • written instructions • drawings • reports (e.g. mines reports, geological reports, logs from previous drilling)
Hazards	<p>may include:</p> <ul style="list-style-type: none"> • electricity wires (underground and overhead) • (pressured) water pipes • telephone lines/cables, fiber optic cables • gas pipes • pipes containing 'other' fluids (e.g. petroleum, stormwater, sewers) • predominant wind direction
Methods of drilling and down hole tools	<p>may include:</p> <ul style="list-style-type: none"> • cable tool • auger: <ul style="list-style-type: none"> ➤ solid flight ➤ hollow flight ➤ bucket ➤ short flight • rotary mud • rotary air: <ul style="list-style-type: none"> ➤ rotary air blast ➤ down hole hammer ➤ reverse circulation hammer ➤ air core • vibro core • directional drilling • coal seam drilling • sampling tools - push tubes, core barrels, bits and reamers
Data	<p>may include:</p> <ul style="list-style-type: none"> • checklists of all activities and material • wastage factors • contingency allowances • schedules of quantities and rates • organisation's procedures for calculating and presenting estimates • inspection of cores or chip samples from earlier drilling programs • bore logs and geological/geotechnical reports

Mathematical calculations	<p>may include:</p> <ul style="list-style-type: none"> • carrying out addition, subtraction, multiplication, division length • using appropriate instruments to measure: <ul style="list-style-type: none"> width height diameter weight angle temperature • using calculator • using estimating skills (e.g. mental arithmetic, visualisation of size and quantity)
Permits and licences	<p>may include:</p> <ul style="list-style-type: none"> • Drillers licence (water well and environmental sectors) • Breathing Apparatus (BA) Certificate • proof of attendance at occupational health and safety course • Bore licence • Exploration licence • Hot work permit • Confined space permit • Permit To Work authority • well control certification
Application	<p>may be made with:</p> <ul style="list-style-type: none"> • Water authorities • Fire department, Mines Rescue Organisations (BA Training) • Environment Protection Authorities • various groundwater consultants • industrial complex on which work is being conducted
Occupational Health and Safety (OHS) plan	<p>may include information, legislation and code of practice including:</p> <ul style="list-style-type: none"> • duties and responsibilities • Material Safety Data Sheets (MSDS) • Hazchem registers • maintenance of records of occupational injury and disease • provision of information and training • setting up/working with occupational health and safety committees • emergency response plan

Evidence Guide

Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence including evidence of the following:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions for the planning of drilling programs • implementation of procedures and techniques for the safe, effective and efficient planning of drilling programs
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	<ul style="list-style-type: none"> • the identification of the relevant information and scope of the work required to meet the required outcomes • the identification of viable options and the selection of planning of drilling programs that best meet the required outcomes • working with others to undertake and complete the planning of drilling programs • consistent successful planning of drilling programs
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • equipment and characteristics, technical capabilities and limitations • inspection/research techniques for collection of data: • linear measurement • angular measurement • by manual/electronic means • communication systems, processes and procedures • communication documents including maps, geological and topographical data, diagrams • graphical representation (e.g. maps, diagrams and its uses for interpretation and prediction) • understanding of special requirements for seam gas drilling • environmental requirements for drill sites • OHS planning principles and application
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures • work in a team • apply negotiation skills with clients and other parties • prepare costing, estimations and tenders • apply metric and imperial conversions • apply mathematical skills, including: addition, subtraction, multiplication and division • use project management tools and programs
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and Equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competency may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Mineral Exploration and Development Drilling Level V	
Unit Title	Ensure a Safe Workplace
Unit Code	MIN EDD5 02 0114
Unit Descriptor	<p>This unit covers skills and knowledge required to establish, maintain and evaluate the organisation's Occupational Health and Safety (OHS) policies, procedures and programs in the relevant work area in accordance with OHS legal requirements.</p> <p>Managers play an important role in ensuring the safety of the workplace and the wellbeing of their staff. This unit applies to managers working in a range of contexts. It takes a systems approach and ensures compliance with relevant legislative requirements.</p> <p>All those who have, or are likely to have, a management responsibility for OHS should undertake this unit.</p> <p>It is relevant for those with managerial responsibilities, either as an owner or employee-manager of a business.</p>

Elements	Performance Criteria
1. Establish and maintain an OHS system	<p>1.1. OHS policies which clearly express the organization's commitment are located and communicated to implement relevant OHS legislation in the enterprise.</p> <p>1.2. OHS responsibilities are defined for all workplace personnel in accordance with OHS policies, procedures and programs.</p> <p>1.3. Financial and human resources are identified and approved for the effective operation of the OHS system.</p>
2. Establish and maintain participative arrangements for the management of OHS	<p>2.1. Participative arrangements are established and maintained with employees and their representatives in accordance with relevant OHS legislation.</p> <p>2.2. Issues raised are appropriately resolved through participative arrangements and consultation.</p> <p>2.3. Information about the outcomes of participation and consultation is promptly provided in a manner accessible to employees.</p>
3. Establish and maintain procedures for identifying hazards, and assessing and controlling risks	<p>3.1. Procedures are developed for ongoing hazard identification, and assessment and control of associated risks.</p> <p>3.2. Hazard identification is included at the planning, design and evaluation stages of any change in the workplace to ensure that new hazards are not created by the proposed changes.</p> <p>3.3. Procedures are developed and maintained for selection and implementation of risk control measures in accordance with the hierarchy of control.</p> <p>3.4. Inadequacies in existing risk control measures are identified in accordance with the hierarchy of control and promptly provide resources to enable implementation of new measures.</p>

	3.5. Intervention points are identified for expert OHS advice.
4. Establish and maintain a quality OHS management system	<p>4.1. An OHS induction and training program is developed and provided for all employees as part of the organization's training program.</p> <p>4.2. System is utilized for OHS record keeping allowing identification of patterns of occupational injury and disease in the organization.</p> <p>4.3. The OHS system is measured and evaluated in line with the organization's quality systems framework.</p> <p>4.4. Improvements are developed and implemented to the OHS system to achieve organizational OHS objectives.</p> <p>4.5. Compliance is ensured with the OHS legislative framework so that legal OHS standards are maintained as a minimum.</p>

Variable	Range
OHS legislation	<p>will depend on legislation and requirements, and will include:</p> <ul style="list-style-type: none"> • common law duties to meet general duty of care requirements • regulations and approved codes of practice relating to hazards in the work area • requirements for establishment of consultative arrangements including those for health and safety representatives, and health and safety committees • requirements for effective management of hazards • requirements for provision of information and training including training in safe operating procedures, procedures for workplace hazards, hazard identification, risk assessment and risk control, and emergency and evacuation procedures • requirements for the maintenance and confidentiality of records of occupational injury and disease
Control of associated risks	<p>may include:</p> <ul style="list-style-type: none"> • administrative • counseling/disciplinary processes • elimination • engineering • housekeeping and storage • issue resolution • OHS records maintenance and analysis • personal protective equipment • purchasing of supplies and equipment • workplace inspections including plant and equipment
Organisational health and safety record keeping	<p>may relate to:</p> <ul style="list-style-type: none"> • audit and inspection reports • workplace environmental monitoring records • consultation e.g. meetings of health & safety committees, work group meeting agendas including OHS items and actions • induction, instruction and training

	<ul style="list-style-type: none"> • manufacturers' and suppliers' information including dangerous goods storage lists • hazardous substances registers • plant and equipment maintenance and testing reports • workers compensation and rehabilitation records • first aid/medical post records
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Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills evidence of:</p> <ul style="list-style-type: none"> • detailed knowledge and application of all relevant OHS legislative frameworks • establishment and maintenance of arrangements for managing OHS within the organisations' business systems and practices • identification of intervention points for expert OHS advice • principles and practice of effective OHS management in a small, medium or large business.
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • application of the hierarchy of control (the preferred order of risk control measures from most to least preferred, that is, elimination, engineering controls, administrative controls, personal protective equipment) • hazard identification and risk management • relevant legislation from all levels of government that affects business operation, especially in regard to OHS and environmental issues, equal opportunity, industrial relations and anti-discrimination • reporting requirements.
Underpinning Skills	<p>Demonstrate skills of:</p> <ul style="list-style-type: none"> • analytic skills to analyse relevant workplace data in order to identify hazards, and to assess and control risks • communication skills to consult with staff and to promote a safe workplace • problem-solving skills to deal with complex and non-routine difficulties • technology skills to store and retrieve relevant workplace data.
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and Equipment, and to information on workplace practices and OHS practices.</p>
Assessment Methods	<p>Competency may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test / Oral Questioning • Observation / Demonstration
Context of Assessment	<p>Competency may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Mineral Exploration and Development Drilling Level V	
Unit Title	Manage General Drilling Equipment Maintenance
Unit Code	MIN EDD5 03 0114
Unit Descriptor	This unit covers managing equipment maintenance in the general drilling industry. It includes: planning and preparing for equipment maintenance; managing movement of stock; planning and organising maintenance and overhauls; evaluating new and used equipment; and maintaining inventories of all items needed on site. This unit is appropriate for those working in management roles, at worksites within: Drilling.

Elements	Performance Criteria
1. Plan and prepare for equipment maintenance	<p>1.1. Compliance documentation relevant to managing equipment maintenance in the general drilling industry is accessed, interpreted and applied.</p> <p>1.2. Work instructions are obtained, confirmed and applied for the allocated task.</p> <p>1.3. All potential hazards are identified, managed and reported.</p> <p>1.4. Coordination requirements are resolved with others at the site prior to commencing and during work activities.</p>
2. Manage movement of stock	<p>2.1. Items needed for the worksite are identified.</p> <p>2.2. Delivery of stock, parts and consumables from suppliers and an alternative supplier is charged cost and planned having regard to delivery timeframes.</p> <p>2.3. Checklist of all materials and spares is prepared and maintained to ensure the drilling operation continues effectively.</p> <p>2.4. Arrangements are made for the safe and secured storage on site/in store/workshop, of materials and spare parts.</p> <p>2.5. Wear parts and relative frequency of replacement are identified and replacement costs determined.</p> <p>2.6. Orders are placed for stock or equipment maintenance in advance of need, to ensure continuous availability.</p> <p>2.7. Procedures are developed and implemented for issue, return and recording of stock movement.</p> <p>2.8. Inventory is maintained in accordance with company requirements.</p> <p>2.9. Parts usage is recorded accurately and in compliance with requirements.</p>

<p>3. Plan and organize maintenance and overhauls</p>	<p>3.1. Type and frequency of maintenance tasks are determined.</p> <p>3.2. Equipment maintenance and service are organized to ensure availability is maintained and downtime minimized.</p> <p>3.3. Performance of maintenance schedules is monitored and corrective action taken, if necessary.</p> <p>3.4. Sources are arranged for obtaining back-up or replacement equipment.</p> <p>3.5. Competent personnel are allocated to carry out maintenance tasks.</p> <p>3.6. Ensure records are maintained in compliance with requirements.</p>
<p>4. Evaluate new and used equipment</p>	<p>4.1. Materials and equipment are tested to ensure continuing serviceability in compliance with requirements.</p> <p>4.2. Availability of new and used equipment is monitored.</p> <p>4.3. Costs/benefits of replacing equipment are evaluated and the purchase/lease of replacement equipment is recommended/implemented.</p>
<p>5. Maintain inventories of all items needed on site</p>	<p>5.1. Individual machine records are monitored in line with replacement policies.</p> <p>5.2. Economic stock levels are maintained by implementing a stock control system to record stock levels and stock usages.</p> <p>5.3. Performance of stock control system is monitored and corrective action taken if required.</p> <p>5.4. Approved requisition/purchasing procedures is/are used to order parts and supplies at the appropriate time and in the appropriate quantity.</p> <p>5.5. Stocktaking is carried out and ongoing stock levels rotated and monitored to ensure continuing availability of spares and materials and in compliance with requirements.</p> <p>5.6. A hazardous substances register is kept.</p> <p>5.7. Resources/stock required for servicing are/is ensured to be available only on authorized access.</p> <p>5.8. Waste or damage to spare parts is prevented/minimized in storage.</p> <p>5.9. Approximate timelines are determined for re-ordering.</p> <p>5.10. Replacement of equipment, consumables, components and materials is calculated/estimated and ordered.</p> <p>5.11. Any problems with stock control or availability of parts are reported to appropriate personnel.</p>

Variable	Range
Relevant compliance documentation	may include: <ul style="list-style-type: none"> • legislative, organisation and site requirements and procedures • manufacturer's guidelines and specifications • Relevant Ethiopian standards • code of practice • Employment and Workplace Relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Work instructions	may include: <ul style="list-style-type: none"> • nature and scope of tasks • specifications • operational conditions • obtaining of permits required • site layout • worksite inspection requirements • plant or equipment defects • hazards and potential hazards • coordination requirements or issues • contamination control requirements • environmental control requirements • barricade and signage requirements
Coordination requirements	may include: <ul style="list-style-type: none"> • drill rig operators • maintenance personnel • supervisors
Cost items	may include: <ul style="list-style-type: none"> • plant equipment and hire • fuel, materials, drilling stores and bits • maintenance and drill string replacement
Spares and consumables	may be identified by: <ul style="list-style-type: none"> • diagrams in maker handbooks and other documents • lists in maker handbooks and other documents • labels, bar codes, and on items
Scheduling	may include: <ul style="list-style-type: none"> • flow charting • timelines/diagrams • critical path • Just In Time (JIT)
Methods of maintaining stock levels	may include: <ul style="list-style-type: none"> • two bin system • re-order level system • re-order cycle system • any of the above operating with computer assistance • replenishment system

Evidence Guide	
Critical Aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions for the managing of equipment maintenance in the general drilling industry • implementation of procedures and techniques for the safe, effective and efficient managing of equipment maintenance in the general drilling industry • the identification of the relevant information and scope of the work required to meet the required outcomes • the identification of viable options and the selection of options that best meet the required outcomes • working with others to undertake and complete equipment maintenance in the general drilling industry • consistent successful management of equipment maintenance in the general drilling industry
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • equipment and ancillary attachment characteristics, technical capabilities and limitations • wear parts and relative frequency of replacement • purpose of stock control • financial transactions (e.g. cash flow, cost benefit analysis)
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures • apply stocks checking and maintenance requirements and procedures • apply cost benefit analysis • apply equipment/consumables order procedures • apply reporting procedures
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and Equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competency may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Mineral Exploration and Development Drilling Level V	
Unit Title	Manage Drilling Induction and Orientation
Unit Code	<u>MIN EDD5 04 01114</u>
Unit Descriptor	This unit covers the management of drilling induction and orientation in the drilling industry. It includes planning and preparing to manage drilling induction and orientation, examining general safety practices, communicating first aid/emergency response arrangements, and examining general safety practices.

Elements	Performance Criteria
1. Plan and prepare to manage drilling induction and orientation	<p>1.1. Compliance documentation relevant to managing equipment maintenance in the general drilling industry is accessed, interpreted and applied.</p> <p>1.2. Work instructions are obtained, confirmed and applied for the allocated task.</p> <p>1.3. All potential hazards are identified, managed and reported.</p> <p>1.4. Coordination requirements are resolved with others at the site prior to commencing and during work activities.</p>
2. Examine general safety practices	<p>2.1. Policies/procedures are obtained and reviewed in relation to alcohol, drugs and firearms/weapons and communicated to all parties.</p> <p>2.2. Chain of command and communication strategies are developed and communicated to all parties.</p> <p>2.3. Hazard identification, reporting and recording mechanisms are put in place and requirements communicated to all parties.</p> <p>2.4. Personal protective equipment and procedures are assessed and procedures put in place to communicate and monitor adherence to legislative/company requirements.</p> <p>2.5. Hazardous materials handling and transport arrangements are identified and procedures are established and communicated to manage and prevent uncontrolled/unauthorized release.</p> <p>2.6. Hazardous energy control and fire safety procedures are put in place and responsibilities communicated to all parties.</p> <p>2.7. Mechanical equipment and manual handling hazard control measures are identified and procedures established and communicated to avoid non-conformance.</p>

	2.8. Rig working and living conditions including work rosters and camp rules are discussed.
3. Communicate first aid/emergency response arrangements	<p>3.1 First aid requirements are identified and discussed with all parties.</p> <p>3.2 Dangers associated with the use of first aid applications are identified and highlighted.</p> <p>3.3 Blood borne pathogens and precautions are identified to identify contamination and convey to all parties.</p> <p>3.4 Different types of alarms, their uses and authorizations are identified and communicated to all parties.</p>
4. Examine general safety practices	<p>4.1 Policies/procedures are obtained and reviewed in relation to alcohol, drugs and firearms/weapons and communicate to all parties.</p> <p>4.2 Chain of command and communication strategies are developed and communicated to all parties.</p> <p>4.3 Hazard identification, reporting and recording mechanisms in place are put and requirements communicated to all parties.</p> <p>4.4 Personal protective equipment and procedures are assessed and procedures put in place to communicate and monitor adherence to legislative/company requirements.</p> <p>4.5 Hazardous materials handling and transport arrangements are identified and procedures established and communicated to manage and prevent uncontrolled/unauthorized release.</p> <p>4.6 Hazardous energy control and fire safety procedures are put in place and responsibilities communicated to all parties.</p> <p>4.7 Mechanical equipment and manual handling hazard control measures are identified and procedures established and communicated to avoid non-conformance.</p> <p>4.8 Rig working and living conditions including work rosters and camp rules are discussed.</p>

Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organisational and site requirements and procedures • manufacturer's guidelines and specifications • Relevant Ethiopian standards • code of practice • Employment and workplace relations legislation

	<ul style="list-style-type: none"> • Equal Employment Opportunity and Disability Discrimination legislation • Petroleum Submerged Lands Act (PSLA) • duty of care
Work instructions	<p>may come from briefings, handovers, plans and work orders and may be written or verbal, formal or informal and may include:</p> <ul style="list-style-type: none"> • names of inductees • level of induction (e.g. experienced or green hands) • presentation aids: <ul style="list-style-type: none"> • signs • schematics • videos etc • safety briefing/induction • pre-tour safety meeting • weekly safety meetings • where to go in an emergency - muster points • acceptable smoking area • out of bounds areas (e.g. SCR shack) • safe practice • 12 hour shifts • 14 day/21 day roster • individual operation • team operation • use of personal protective equipment • consideration of H2S and other toxic substances • continuous communication maintained • reacting to on-site emergencies
Hazards	<p>may include</p> <ul style="list-style-type: none"> • working in proximity to drilling rig • working in different conditions including: <ul style="list-style-type: none"> ➢ night time operations ➢ day time operations ➢ hot climates ➢ cold climates ➢ wet weather conditions and high wind
Coordination requirements	<p>may include:</p> <ul style="list-style-type: none"> • other equipment operators • maintenance personnel • supervisors • site personnel
Communicate	<p>may be via:</p> <ul style="list-style-type: none"> • 2-way radio • hand signals • telephone • public address system • written work instructions • internet and intranet

Communication	may be between: <ul style="list-style-type: none"> • crew • service companies • operator's representative
Reporting mechanisms	may include: <ul style="list-style-type: none"> • location arrival procedures • work permits • trip (vehicle) report

Evidence Guide	
Critical aspects of Competence	Must demonstrate knowledge and skills competence to: <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions for managing drilling induction and orientation • implementation of requirements, procedures and techniques for the safe, effective and efficient management of drilling induction and orientation • working with others to plan, prepare and manage drilling induction and orientation • evidence of the consistent successful management of drilling induction and orientation
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: <ul style="list-style-type: none"> • all operational procedures (safe practice) • award entitlements (e.g. overtime) • safe working practice • human management skills • company reporting procedures • general mechanical/electrical operating functions • down-hole problems and solutions • drills (e.g. fire, BOP, gas detection)
Underpinning Skills	Demonstrate skills to: <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures for managing drilling induction and orientation • verbal and written communication • accurate reporting • safely operate drilling rig (e.g. stand in for driller) • show leadership in critical situations
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: <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level V	
Unit Title	Manage Drilling Operations
Unit Code	MIN EDD5 05 0114
Unit Descriptor	This unit covers managing drilling operations in the drilling industry. It includes planning and preparing for managing drilling operations, implementing drill management strategies, managing occupational health and safety obligations, overseeing drilling operations.

Elements	Performance Criteria
1. Plan and prepare for managing drilling operations	<p>1.1. Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2. Work instructions are obtained, confirmed and applied for the allocated task.</p> <p>1.3. All potential hazards are identified, managed and reported.</p> <p>1.4. Coordination requirements are resolved with others at the site prior to commencing and during work activities.</p>
2. Implement drill management strategies	<p>2.1. Copies of contract and well program, design implementation strategies are obtained and checked and communicated to all parties.</p> <p>2.2. Daily drilling reports and tour sheets are prepared and communicated to all parties.</p> <p>2.3. Inspections of operating site and camp and record/ report are undertaken.</p> <p>2.4. Communication strategies are established and confirmed with operator's representative.</p> <p>2.5. Legislative/company requirements are reviewed, confirmed and communicated to appropriate personnel.</p> <p>2.6. Appropriate reporting mechanisms are put in place.</p> <p>2.7. Rig maintenance arrangements are established and communicated to all parties.</p>
3. Manage occupational health and safety obligations	<p>3.1. Crew meeting arrangements and minute outcomes are put in place and carried out and reported to appropriate officers.</p> <p>3.2. Safety inspection strategies are established, implemented, monitored and recorded/reported.</p> <p>3.3. New employees are inducted into site operations and appropriate monitoring strategies put in place.</p> <p>3.4. Permit-to-work systems is established, implemented, monitored and recorded/reported.</p> <p>3.5. Emergency response arrangements are identified, implemented and communicated to all parties.</p> <p>3.6. Environmental legislative/ company requirements are identified, implemented and monitored and rectified or reported.</p>

	3.7. Non-conformances to appropriate authorities/officers are identified, rectified and reported.
4. Oversee drilling operations	<p>4.1. Drill program is obtained, checked and communicated to appropriate officers/personnel.</p> <p>4.2. Drilling tools and equipment are organized and appropriate checking processes put in place.</p> <p>4.3. Appropriate reporting mechanisms are put and monitored.</p> <p>4.4. Safe work practices and adherence to drilling instructions are assessed and rectified if required.</p> <p>4.5. Well control and blowout prevention strategies and report are implemented, maintained and monitored.</p> <p>4.6. Appropriate tests and report are carried out and monitored.</p>

Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organisational and site requirements and procedures • manufacturer's guidelines and specifications • Relevant Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation • duty of care • Occupational Health and Safety (OHS) • Environmental Protection Act • Workplace Relations Act • union awards
Work instructions	<p>may come from briefings, handovers, plans and work orders and may be written or verbal, formal or informal and may include:</p> <ul style="list-style-type: none"> • employee mentoring • driller training • ongoing supervisor for hazard identification • close surveillance of new employees • nature and scope of tasks • specifications • quality of finished works • achieved targets • operational conditions • obtaining of required permits • site layout • out of bounds areas • worksite inspection requirements • lighting conditions • plant of equipment defects • coordination requirements or issues

	<ul style="list-style-type: none"> • contamination control requirements • environmental control requirements • barricade and signage requirements • rig manager change over notes • safety briefing/induction • morning reports • pre-tour safety meeting • pre-spud meetings • weekly safety meetings • Job Safety Analysis (JSA)
Hazards	<p>may include:</p> <ul style="list-style-type: none"> • working in proximity to drilling rig • working in different conditions including: <ul style="list-style-type: none"> ➤ night time operations ➤ day time operations ➤ hot climates ➤ cold climates ➤ wet weather conditions ➤ high wind
Coordination requirements	<p>may include:</p> <ul style="list-style-type: none"> • other equipment operators • maintenance personnel • supervisors • site personnel • continuous communication maintained • team operation
Communicate	<p>may be via:</p> <ul style="list-style-type: none"> • 2-way radio • hand signals • telephone • public address system • written work instructions • internet and intranet
Communication	<p>may be between:</p> <ul style="list-style-type: none"> • crew • service companies • operator's representative
Reporting mechanisms	<p>may include:</p> <ul style="list-style-type: none"> • daily drilling report • equipment damage/failure report • material requisition form • plant movement advice • materials and services received (report) • gas bottle returns • third party hire and monthly stock lists • change over notes • employee time sheets • drilling rate sheet

	<ul style="list-style-type: none"> • meal and bed sheet • fire extinguisher checklist • monthly tubular summary
Drilling instructions	<p>may include:</p> <ul style="list-style-type: none"> • issues highlighted in pre-spud safety inspector aspects of drilling program that detail contractor liability drilling parameters maintenance requirements

Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence of:</p> <ul style="list-style-type: none"> • the requirements, procedures and instructions for managing drilling operations • implementation of requirements, procedures and techniques for the safe, effective and efficient management of drilling operations • working with others to plan, prepare and manage drilling operations • evidence of the consistent successful management of drilling operations
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • document control • operational procedures • legislative requirements • maintenance • safety • well control down hole • problems and solutions
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures for managing drilling operations • manage rig operation and performance • communicate at all levels of operations • identify, assess, control and report hazards/situations • control down hole problems • interpreting of gauges, graphs etc • calculations relating to pressure (hydrostatic, surface, down hole, circulating), density, volume (fluid, air, gas), height, velocity, length, weight • measurements (penetration rate, rotary torque, rpm, pump pressure) • coordinate and delegate • apply occupational health and safety/environmental regulations • budget and monitor operating costs
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and Equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competency may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Mineral Exploration and Development Drilling Level V	
Unit Title	Implement, Monitor, Rectify and Report on Inventory control system
Unit Code	<u>MIN EDD5 06 0114</u>
Unit Descriptor	This unit covers the requirements to implement, monitor, rectify and report on inventory control system in the resources and infrastructure industries. It includes: implementing, monitoring, rectifying and reporting on inventory control system.

Elements	Performance Criteria
1. Implement inventory control system.	<p>1.1. Compliance documentation relevant to implementing, monitoring, rectifying and reporting on inventory control systems are accessed, interpreted and applied.</p> <p>1.2. Resources, both human and technical, required to support implementation are identified, and put in place</p> <p>1.3. Record keeping procedures are implemented.</p> <p>1.4. Processes for controlling stock are implemented.</p> <p>1.5. Reporting processes are implemented.</p> <p>1.6. System is communicated to stakeholders.</p>
2. Monitor inventory control system.	<p>2.1. Procedures are established for monitoring inventory control system.</p> <p>2.2. Inventory control system is audited according to organizational specifications.</p> <p>2.3. Discrepancy reporting procedures are implemented.</p> <p>2.4. Production of inventory system reports is supervised.</p> <p>2.5. Inventory reports are analyzed.</p> <p>2.6. Major trends are identified.</p> <p>2.7. Areas requiring adjustment are identified and documented and relevant personnel notified.</p>
3. Rectify inventory control system.	<p>3.1. Procedures are developed for adjusting procedures and performance.</p> <p>3.2. Modifications are undertaken to inventory control system according to organizational procedures.</p> <p>3.3. Modifications are tested and further modifications made where necessary.</p> <p>3.4. Modifications are recorded and reported to relevant personnel.</p>
4. Report on inventory control system.	<p>4.1. Results of inventory control are documented in accordance with organizational specifications.</p> <p>4.2. Relevant parties are informed of the results of inventory control according to organization's guidelines.</p>

Variable	Range
Relevant compliance documentation	<p>May include</p> <ul style="list-style-type: none"> • legislative, organisation and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Resources	<p>Required include:</p> <ul style="list-style-type: none"> • clerical / computer applications for maintaining records • technical support • data storage facilities
Record keeping procedures	<p>Include:</p> <ul style="list-style-type: none"> • requisition • purchasing • shipping • invoicing
Processes for controlling stock	<p>Include:</p> <ul style="list-style-type: none"> • inventory lists • stock lists
Organisational systems, policies and procedures	<p>may include:</p> <ul style="list-style-type: none"> • quality systems • standard operating procedures • standard work practices • organisational commitment • corporate policy • community consultation and involvement • objectives and targets • documentation and targets • documentation and records • responsibility and reporting structure • inventory review audits • supply and financial monitoring and measurement • organisational Code of Practice, Ethical Codes

Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions to implement, monitor, rectify and report on inventory control system • implementation of procedures and techniques to safely, effectively and efficiently implement, monitor, rectify and report on inventory control system • the identification of the relevant information and scope of the work required to meet the required outcomes • the identification of viable options and the selection of pit plans that best meet the required outcomes

	<ul style="list-style-type: none"> • working with others to implement, monitor, rectify and report on inventory control system • consistently and successfully implement, monitor, rectify and report on inventory control system
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • site and equipment safety requirements • monitoring of documentation • auditing procedures • software characteristics, technical capabilities and limitations • reporting systems • archiving • record keeping procedures • sources of stock / inventory information • continuous improvement processes • work roles
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures • apply procedures for identifying and interpreting trends from inventory records • read, interpret and apply inventory information • apply diagnostic techniques • apply inventory system relationship to manufacturing process • apply inventory system recording and reporting requirements and procedures • apply records maintenance requirements • apply oral and written communication techniques • apply safe working practices • apply standard operating 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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level V	
Unit Title	Identify, Implement and Maintain Legal Compliance Requirements
Unit Code	MIN EDD5 07 0114
Unit Descriptor	This unit covers the identification, implementation and maintenance of legal compliance requirements in the resources and infrastructure industries. It includes providing information about the scope, implementation, management, prioritisation and training for legal compliance requirements. It also provides information about implementing and monitoring procedures for maintaining legal records and for dealing with non-compliance events. 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. Provide information about the scope of legal and organizational compliance procedures	<p>1.1. Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2. Relevant provisions of legislation and code of practice relevant to the workplace and how they impact on business arrangements are explained.</p> <p>1.3. Information on the organization's policies, procedures, programs and business arrangements within the legal compliance context is provided.</p> <p>1.4. Information and documentation regarding legal compliance are evaluated and provided to the work group.</p> <p>1.5. Approval of plans is obtained from relevant personnel.</p>
2. Implement and monitor organization's procedures for the management of legal compliance	<p>2.1. Legal compliance management systems and procedures are implemented and monitored to maximize compliance opportunities.</p> <p>2.2. Search for, identify, review and report on legal compliance requirements regularly so issues may be raised and dealt with in a prompt and appropriate manner.</p> <p>2.3. Identify and periodically review if adequate resources have been allocated to implement legal compliance and inform appropriate parties promptly.</p> <p>2.4. Ensure all members of the workgroup have the opportunity to contribute to issues on legal compliance and ensure information is stored and reviewed within the organization.</p>
3. Implement, monitor and prioritize compliance requirements within	<p>3.1. Information on legal compliance is collected and reviewed and any existing or potential non-compliance issues are reported so they can be addressed appropriately.</p>

organizational procedures	<p>3.2. Compliance information is evaluated and clarified to all relevant personnel.</p> <p>3.3. Implications of non-compliance are identified.</p> <p>3.4. Legal compliance requirements are grouped into critical, important and incidental classifications so that non-compliance issues can be prioritized and appropriate measures implemented to prevent or minimize reoccurrence of non-compliance.</p>
4. Implement, monitor and document procedures and training for compliance requirements	<p>4.1. Documentation on training needs and workplace procedures is identified, implemented, monitored and provided to ensure compliance.</p> <p>4.2. Legal compliance measures are monitored and reported to relevant personnel to ensure legal compliance is part of the organization's general training program.</p> <p>4.3. Appropriate legal compliance training programs are implemented in consultation with relevant personnel.</p> <p>4.4. Inadequacies in existing legal compliance measures and resource allocation are identified and reported to management.</p>
5. Implement and monitor procedures for maintaining legal records and for dealing with non-compliance events	<p>5.1. Workplace procedures are implemented to deal with non-compliance events in a timely manner while keeping accurate legal records.</p> <p>5.2. The cause of non-compliance events identify and is investigated using the work areas records in accordance with investigation procedures.</p> <p>5.3. Recurrence of non-compliance is minimized by using systems for reporting maintenance of legal compliance.</p>

Variable	Range
Compliance documentation	<p>May include:</p> <ul style="list-style-type: none"> • organisation and site requirements and procedures • manufacturer's guidelines and specifications • Relevant Ethiopian standards • award and enterprise agreements and relevant industrial instruments • relevant legislation from all levels of government that affects business operation, especially in regard to: <ul style="list-style-type: none"> ➤ OHS ➤ environmental issues ➤ equal opportunity ➤ industrial relations ➤ anti-discrimination • relevant industry code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation

Legal compliance	<p>May include:</p> <ul style="list-style-type: none"> • waterways • workers compensation/work cover • planning and assessment • local government • licensing requirements • duty of care • environmental • industrial relations • navigation • EHS Management System • policy • standards • procedures • databases • decision making • reviews • conventions • making permanent changes • maintenance of records of legal breaches • provision of information and training • regulations and code of practice relating to legal compliance • site representatives and committees • issue resolution • business registration • license to practice • industrial • fire • superannuation • partnership agreement • insurance • constitution documents • Acts • tender documents • financial documentation • development and implementation of compliance training measures
Documentation	<p>May include:</p> <ul style="list-style-type: none"> • legislation • code of practice • organisation's policies/procedures • statutory and regulatory requirements • legal compliance
Legal compliance management systems	<p>May include:</p> <ul style="list-style-type: none"> • work schedules - shift work and varying hours of duty • environments from simple to complex and diverse • appropriate policies, guidelines and processes

	<ul style="list-style-type: none"> • autonomy, from limited to substantial • quality and continuous improvement processes and standards • business plans • performance plans • ethical standards established by the organisation • productivity and profitability objectives and targets • best practice and benchmarking principles • legislation, codes and practices • resource parameters which may be defined or negotiated • training and development principles and practices • human resource policies and practices including: <ul style="list-style-type: none"> ➤ interviewing ➤ counseling ➤ dispute resolution ➤ discipline • financial accountability including: <ul style="list-style-type: none"> • profit and loss statements • enterprise/industrial agreements/awards • operations of a particular section or organisational unit • full range of operations of an organisation at a particular site • full range of operations of an organisation distributed across multiple sites • full range of operations of an organisation including mobile units such as the following: <ul style="list-style-type: none"> ➤ vehicles ➤ railway trains ➤ maritime vessels ➤ aircraft
Resources	<p>May include:</p> <ul style="list-style-type: none"> • Acts • legislation/regulations • information • Common Law • the community
Legal compliance measures	<p>May include:</p> <ul style="list-style-type: none"> • development of training programs • implementation of training programs
Consultation	<p>May include with:</p> <ul style="list-style-type: none"> • regulatory authorities • tenderers • project managers • contractors • employees • community • customers • suppliers

Management	<p>May include:</p> <ul style="list-style-type: none"> • leader/coach • facilitator • mentor • participant • assessor
Accurate legal records	<p>May include:</p> <ul style="list-style-type: none"> • statutory/legal records • training needs • resource allocation • OHS • financial • personnel • taxation

Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions for identifying, implementing and maintaining legal compliance requirements • implementation of procedures and techniques for the safe, effective and efficient identification, implementation and maintenance of legal compliance requirements • the identification of the relevant information and scope of the work required to meet the required outcomes • the identification of viable options and the selection of legal compliance requirements that best meet the required outcomes • working with other to undertake and complete the identification, implementation and maintenance of legal compliance requirements • consistent successful identification, implementation and maintenance of legal compliance requirements
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • legal compliance rights • environmental compliance requirements • compliance insurance requirements • contractual rights and responsibilities • record-keeping systems required for compliance management • complaints handling systems • continuous improvement processes for compliance including: <ul style="list-style-type: none"> ➤ monitoring ➤ reporting ➤ evaluation and review • relevant organisation policies and procedures including: <ul style="list-style-type: none"> ➤ policies in various compliance area ➤ organizational standards for operations and ethics

Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures for identification, implementation and maintenance of legal compliance requirements • maintain legal and organisational compliance procedures and policies • use effective consultative mechanisms to negotiate compliance processes and procedures appropriate to statutory/legal requirements • explain complex compliance information to relevant personnel • provide coaching and mentoring support to encourage compliance • read, interpret and apply compliance legislation • relate to people from a range of social, cultural and ethnic backgrounds • source information on compliance requirements • organise and review information on 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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level V	
Unit Title	Implement and Maintain Management Systems to Control Risk
Unit Code	MIN EDD5 08 0114
Unit Descriptor	This unit covers the implementation and maintenance of management systems to control risk in resources and infrastructure industries. It includes developing the framework for and processes to support site risk management systems; planning and implementing risk management systems; and monitoring, reviewing and updating risk management processes.

Elements	Performance Criteria
1. Develop the framework for the site risk management system	<p>1.1. Compliance documentation relevant to implementing and maintaining management systems is accessed, interpreted and applied to control risk.</p> <p>1.2. Site objectives in the area of managerial responsibility, are developed and documented in consultation with relevant personnel, and conforming to the organization's policy and system's procedures.</p> <p>1.3. The structures are developed and documented for the application of the management system, in consultation with relevant personnel.</p> <p>1.4. The responsibilities are defined, allocated and documented for applying the management system in job descriptions and duty statement for all relevant site positions.</p>
2. Develop the processes to support the site risk management system	<p>2.1. Existing and potential site hazards and risks in the area of managerial responsibility are identified from site inspection and trends identified from the record system.</p> <p>2.2. The organization's criteria is accessed, interpreted and clarified for assessing and treating risks.</p> <p>2.3. Detailed site procedures and practices are developed and documented for the application of the management system in consultation with relevant personnel.</p> <p>2.4. Information sources and expert advice required to support the management system are identified, obtained and maintained.</p>
3. Plan and implement the risk management system	<p>3.1. How the management systems will be introduced are planned, scheduled and documented to the entire work site.</p> <p>3.2. Resources are identified, sought and/or provided for the operation of the management system, in a timely and consistent manner.</p>

	<p>3.3. Information on the site management system is provided and explained in a form readily accessible to site employees.</p> <p>3.4. Appropriate development and/or training is/are provided or arranged for site personnel on the risk management systems' site procedures and practices.</p> <p>3.5. Available information on known and intended process changes and enhancements is made to site personnel.</p> <p>3.6. Support and encouragement are provided to those responsible for the detailed system activities.</p> <p>3.7. Ensure all management systems' records and reports are produced, processed and maintained.</p>
4. Monitor, review and update the risk management processes	<p>4.1. The management systems' activities and achievement targets are monitored and resources provided/ focused to ensure the implementation plan is satisfied.</p> <p>4.2. The management systems' implementation plan is reviewed and updated periodically and when changing circumstances are anticipated or occur.</p> <p>4.3. Management system documentation including the reasons for and changes made to the system are completed and retained.</p>

Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organisation and site requirements and procedures • manufacturer's guidelines and specifications • Relevant Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
The areas of managerial responsibility	<p>covered by this may include:</p> <ul style="list-style-type: none"> • statutory compliance • occupational health and safety • environment • quality • property security • business risks, such as: <ul style="list-style-type: none"> ➤ credit management and capital expenditure ➤ sales and marketing ➤ finance and accounting
The policy	<p>is:</p> <ul style="list-style-type: none"> • the statement of overall intent and direction of the organisation in respect of the specific area of managerial responsibility

The system's procedures	<p>are:</p> <ul style="list-style-type: none"> the procedures that support and expand on the policy and set out the requirements for implementing the system on individual sites. They provide direction and guidance to those responsible for implementation of the system and in the preparation of site-specific work procedures, instruction and practices to put the system into effect
System's procedures	<p>may include:</p> <ul style="list-style-type: none"> identification of hazards risk identification risk assessment risk treatment interim solutions dealing with unplanned incidents and events consultation communication monitoring review record keeping reporting training
Hazards	<p>are:</p> <ul style="list-style-type: none"> sources of potential harm or situations with the potential to cause loss
Risk	<p>is:</p> <ul style="list-style-type: none"> the chance of something happening that will have an impact upon objectives. It is measured in terms of consequence and likelihood
Risk identification	<p>is:</p> <ul style="list-style-type: none"> the process of determining what can happen, why and how
Risk treatment	<p>is:</p> <ul style="list-style-type: none"> the selection and implementation of appropriate options for dealing with risk <p>should:</p> <ul style="list-style-type: none"> considered using options in sequence from eliminating the hazard, substitution, engineering controls, administrative controls, and finally PPE
Site procedures and practices	<p>may include:</p> <ul style="list-style-type: none"> standard operating procedures safe operating procedures work instructions emergency procedures allocation of responsibilities permit requirements sampling, testing and worksite inspection requirements documentation and reporting requirements

Consultation with relevant personnel	<p>Would typically include:</p> <ul style="list-style-type: none"> • senior management • subject matter experts • regulatory authorities • tenderers • project managers • contractors • employees • community • customers • suppliers
Resources	<p>may include:</p> <ul style="list-style-type: none"> • people • finance • equipment • buildings/facilities • technology • information
Site personnel	<p>may include:</p> <ul style="list-style-type: none"> • employees • contractors
Records and reports	<p>may include:</p> <ul style="list-style-type: none"> • results • recommendations • assessment forms • action planning documents, etc
Monitor	is to check, supervise, observe critically, or record the progress of an activity, action or system on a regular basis in order to identify change
Management systems documentation	<p>may need to include:</p> <ul style="list-style-type: none"> • requirements for the maintenance of records for statutory/legal breaches • provision of information and training • regulations and code of practice relating to statutory/legal compliance • site representatives and committees • issue resolution

Evidence Guide

Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> • the requirements, procedures and instructions for the implementation and maintenance of management systems to control risk • implementation of procedures and techniques for the safe, effective and efficient implementation and maintenance of management systems to control risk • the identification of the relevant information and scope of the work required to meet the required outcomes
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	<ul style="list-style-type: none"> • working with others to undertake and complete the implementation and maintenance of management systems to control risk • consistent successful implementation and maintenance of management systems to control risk
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • relevant legislative requirements • roles and responsibilities of relevant personnel within the organisation • action planning methods • human resource management processes • method of identifying appropriate action based on cost, safety, and welfare issues • work procedure and instruction documentation requirements • reporting and recording procedures • work site operating procedures • hazard identification processes • risk assessment processes • risk treatment processes • documentation methods
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures to implement and maintain management systems to control risk • develop and maintain site procedures and practices • read, interpret, apply and communicate technical information, rules, procedures, regulations • apply legislative, organisation and site requirements and procedures to implement and maintain management systems to control risk • develop and maintain site procedures and practices • read, interpret, apply and communicate technical information, rules, procedures, regulations • apply legislative, organisation and site requirements and procedures to implement and maintain management systems to control risk • develop and maintain site procedures and practices • read, interpret, apply and communicate technical information, rules, procedures, regulations
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and Equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competency may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Mineral Exploration and Development Drilling Level V	
Unit Title	Manage Well Completion and Abandonment
Unit Code	MIN EDD5 09 0114
Unit Descriptor	This unit covers managing the completion and abandonment of wells in the onshore drilling industry. It includes planning and preparing for managing well completion and abandonment, organising the completion schedule, and completing well abandonment.

Elements	Performance Criteria
1. Plan and prepare for managing well completion and abandonment.	<p>1.1. Compliance documentation relevant to the work activity is accessed, interpreted and applied.</p> <p>1.2. Work instructions are obtained, confirmed and applied for the allocated task.</p> <p>1.3. All potential hazards are identified, managed and reported.</p> <p>1.4. Coordination requirements are resolved with others at the site prior to commencing and during work activities.</p>
2. Organize completion schedule.	<p>2.1. Completion schedule is developed in line with drilling contract and well prognosis.</p> <p>2.2. Lease details are reviewed and confirmed, as necessary and notifications are forwarded to statutory, company, owner and contractor representatives.</p> <p>2.3. Preparations are made for release of rig and tour book records completed in accordance with statutory and company requirements.</p> <p>2.4. Ensure that prior to rig move, arrangements are put in place for work orders and invoicing in line with contract requirements and servicing/maintenance repairs of equipment.</p>
3. Complete well abandonment.	<p>3.1. Preparations are made to stack and moved and communicated to all parties.</p> <p>3.2. Environmental plan and mud drilling fluids and waste storage/disposal requirements and correct records are completed and processed.</p> <p>3.3. Shutdown list is prepared in accordance with statutory/company requirements and distribute to crew for auctioning.</p> <p>3.4. Down is rigged in accordance with statutory/company requirements and distributed to crew for auctioning.</p> <p>3.5. Down is rigged ensuring that equipment, camp and rig are secured for removal.</p> <p>3.6. Contract requirements are reviewed, records completed and forwarded to appropriate officers.</p>

Variable	Range
Relevant compliance documentation	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organisational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation • licence checks • load permits • decontamination certificates if moving between quarantine areas
Work instructions	<p>may come from briefings, handovers, plans and work orders and maybe written or verbal, formal or informal and may include:</p> <ul style="list-style-type: none"> • pre-start safety meetings prior to commencement of each work day • delegation of work responsibilities to various teams re: load-out or rig-up • set route for rig move • emergency procedures to follow if lost or disabled • road conditions • new location whereabouts and access • name of property owners (where applicable) • safety procedures • environmental considerations • completion sequence • well head preparation • preparation and inspection of loading slings and chains • material availability if maintenance, servicing or repair is to occur • nature and scope of tasks • specifications • quality of finished works • achieved targets • operational conditions • obtaining of required permits • site layout • out of bounds areas • worksite inspection requirements • lighting conditions • plant of equipment defects • coordination requirements or issues • contamination control requirements • environmental control requirements • barricade and signage requirements

Hazards	<p>may include:</p> <ul style="list-style-type: none"> • working in proximity to drilling rig • working in different conditions including: <ul style="list-style-type: none"> ➤ night time operations ➤ day time operations ➤ hot climates ➤ cold climates ➤ wet weather conditions ➤ high wind
Coordination requirements	<p>may include:</p> <ul style="list-style-type: none"> • other equipment operators • maintenance personnel • supervisors • site personnel
Equipment	<p>may include:</p> <ul style="list-style-type: none"> • cranes • front-end loaders using bucket or forks • winch trucks • prime movers with trailers and dog trailers • carrier mounted rigs and service units
Communicate	<p>may include by:</p> <ul style="list-style-type: none"> • 2-way radio • hand signals • telephone • public address system • written work instructions • internet/intranet
Records	<p>may include:</p> <ul style="list-style-type: none"> • tour book • request of materials received • transport manifests

Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence of:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions for managing well completion and abandonment • implementation of requirements, procedures and techniques for the safe, effective and efficient management of well completion and abandonment • working with others to plan, prepare and manage well completion and abandonment • evidence of the consistent successful management of well completion and abandonment
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • well completion or abandonment procedures • rigging and dogging practices • auxiliary equipment functions and service requirements • specific rig tear-out sequence

	<ul style="list-style-type: none"> • road haulage regulations • safety and environmental issues • communication equipment • emergency procedures • preventative maintenance • workplace relations and award conditions
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures for managing well completion and abandonment • operate rig components • oversee forklift operations • use satellite or ground communication • issue permits and work orders • organise work teams into efficient working units • dog a crane and secure rigging • troubleshoot breakdowns
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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level V	
Unit Title	Implement and Maintain Environmental Management Plan
Unit Code	MIN EDD5 10 0114
Unit Descriptor	<p>This unit covers the implementation and maintenance of site environmental management plans in resources and infrastructure industries. It includes the requirements to: develop the framework of the plan, the processes to support the plan; prepare and implement the plan; and monitoring, reviewing and updating the management processes.</p> <p>This unit is appropriate for those working in a management or as a technical specialist roles, within: Civil construction, Coal mining, Drilling, Extractive industries, and Metalliferous mining</p>

Elements	Performance Criteria
1. Develop the framework for the site environmental management plan.	<p>1.1. Compliance documentation relevant to the implementation and maintenance of site environmental management plans is accessed, interpreted and applied.</p> <p>1.2. Site environmental objectives are developed and documented in consultation with relevant personnel, and conforming to the organization's policy and system's procedures.</p> <p>1.3. The structures are developed and documented for the application of the environmental management system, in consultation with relevant personnel, and conforming to the organization's policy and system's procedures.</p> <p>1.4. The responsibilities are defined, allocated and documented for applying the environmental management plan in job descriptions and duty statement for all relevant site positions.</p>
2. Develop the processes to support the site environmental management plan.	<p>2.1. Existing and potential site environmental hazards and risks are identified from trends identified from site inspection and the record system.</p> <p>2.2. The organization's criteria is accessed, interpreted and clarified for assessing and treating risks.</p> <p>2.3. Detailed site procedures and practices are developed and documented for the application of the environmental management system in consultation with relevant personnel.</p> <p>2.4. Information sources and expert advice required to support the environmental management plan are identified, obtained and maintained.</p>
3. Prepare and implement the plan.	<p>3.1. The environmental management plan will be introduced to the entire worksite.</p>

	<p>3.2. Resources are identified, sought and/or provided for the operation of the environmental management plan, in a timely and consistent manner.</p> <p>3.3. Information on the site environmental management plan is provided and explained in a form readily accessible to site employees.</p> <p>3.4. Appropriate development and/or training is/are provided or arranged for site personnel on the environmental management plan site procedures and practices.</p> <p>3.5. Available information on known and intended process changes and enhancements is made to site personnel.</p> <p>3.6. Support and encouragement are provided to those responsible for the conduct of the plan's activities.</p> <p>3.7. Ensure all environmental management plan records and reports are produced, processed and maintained.</p>
<p>4. Monitor, review and update the environmental management processes.</p>	<p>4.1. The environmental management plan activities and achievement targets are monitored and resources provided/ focused to ensure the implementation plan is satisfied.</p> <p>4.2. The environmental management plans implementation plan is reviewed and updated periodically and when changing circumstances are anticipated or occur.</p> <p>4.3. Environmental management plans documentation covering the reasons for and changes made is completed and retained.</p>

Variable	Range
<p>Relevant compliance documentation</p>	<p>may include:</p> <ul style="list-style-type: none"> • legislative, organisation and site requirements and procedures • manufacturer's guidelines and specifications • Relevant Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
<p>Consultation with relevant personnel</p>	<p>would typically include:</p> <ul style="list-style-type: none"> • senior management • subject matter experts • regulatory authorities • tenderers • project managers • contractors • employees • community • customers and suppliers

The policy	<p>is:</p> <ul style="list-style-type: none"> the statement of overall intent and direction of the organisation in respect of the environmental management
The system's procedures	<p>are:</p> <ul style="list-style-type: none"> the procedures that support and expand on the policy and set out the requirements for implementing the environmental management system on individual sites. They provide direction and guidance to those responsible for implementation and the preparation of site-specific work procedures, instruction and practices <p>may include:</p> <ul style="list-style-type: none"> identification of hazards risk identification risk assessment risk treatment interim solutions dealing with unplanned incidents and events consultation communication monitoring review record keeping reporting training
Hazards	<p>are:</p> <ul style="list-style-type: none"> sources of potential harm or situations with the potential to cause loss
Risk identification	<p>is:</p> <ul style="list-style-type: none"> the process of determining what can happen, why and how
Risk assessment	<p>is:</p> <ul style="list-style-type: none"> the overall process of risk analysis and risk evaluation
Risk treatment	<p>is:</p> <ul style="list-style-type: none"> the selection and implementation of appropriate options for dealing with risk <p>should:</p> <ul style="list-style-type: none"> consider using options in sequence from eliminating the hazard, substitution, engineering controls, administrative controls and, finally, PPE
Site procedures and practices	<p>may include:</p> <ul style="list-style-type: none"> standard operating procedures safe operating procedures work instructions emergency procedures allocation of responsibilities permit requirements sampling, testing and worksite inspection requirements documentation and reporting requirements

Resources	<p>may include:</p> <ul style="list-style-type: none"> • people • finance • equipment • buildings/facilities • technology • information
Site personnel	<p>may include:</p> <ul style="list-style-type: none"> • employees • contractors
Records and reports	<p>may include:</p> <ul style="list-style-type: none"> • results • recommendations • assessment forms • action planning documents
Monitor	<p>is to:</p> <ul style="list-style-type: none"> • check, supervise, observe critically, or record the progress of an activity, action or system on a regular basis in order to identify change

Evidence Guide			
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence of:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions for the implementation and maintenance of site environmental management plans • implementation of procedures and techniques for the safe, effective and efficient implementation and maintenance of site environmental management plans • the identification of the relevant information and scope of the work required to meet the required outcomes • the identification of viable options and the selection of options that best meet the site environmental management plan required outcomes • working with others to undertake and complete the implementation and maintenance of site environmental management plans • consistent successful implementation and maintenance of site environmental management plans 		
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • the organisation's environmental policies, goals and objectives • legislative requirements • roles and responsibilities of personnel within the organisation • action planning methods • negotiation skill • written and oral communication methods • receptive listening skills • human resource management processes 		
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	<ul style="list-style-type: none"> • method of identifying appropriate action based on cost, safety, and welfare issues • work procedure and instruction writing • environmental management reporting and recording procedures • worksite operating procedures • environmental hazard identification processes • environmental risk assessment processes • environmental risk treatment processes • environmental management system documentation methods
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • apply legislative, organisation and site requirements and procedures • apply site procedures and practices development and maintenance techniques • read, interpret, apply and communicate technical information, rules, procedures and regulations • apply management planning documentation and facilitation procedures • apply records and documents maintenance requirements • apply procedures for monitoring and deciding on changes to process • provide leadership and guidance for group activities • communicate effectively in the workplace • explain complex information to superiors and subordinates • apply coaching and mentoring support • apply active listening • show sensitivity to the needs and feelings of others • actively encourage the free exchange of 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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level V	
Unit Title	Manage Operational Plan
Unit Code	MIN EDD5 11 0114
Unit Descriptor	<p>This unit covers skills and knowledge required to develop and monitor implementation of the operational plan to provide efficient and effective workplace practices within the organisation's productivity and profitability plans.</p> <p>This unit applies to people who manage the work of others and operate within the parameters of a broader strategic and/or business plan. The task of the manager at this level is to develop and implement an operational plan to ensure that the objectives and strategies outlined in the strategic and/or business plan are met by work teams.</p> <p>At this level work will normally be carried out within complex and diverse methods and procedures, which require the exercise of considerable discretion and judgement, using a range of problem solving and decision making strategies.</p>

Elements	Performance Criteria
1. Develop operational plan	<p>1.1. Resource requirements are researched, analyzed and documented and an operational plan is developed in consultation with relevant personnel, colleagues and specialist resource managers.</p> <p>1.2. Consultation processes are developed and/or implemented as an integral part of the operational planning process.</p> <p>1.3. Details of the operational plan are ensured to include the development of key performance indicators to measure organizational performance.</p> <p>1.4. Contingency plans are developed and implemented at appropriate stages of operational planning.</p> <p>1.5. The development and presentation of proposals are supported for resource requirements by a variety of information sources and specialist advice is sought as required.</p> <p>1.6. Approval is obtained for plan from relevant parties and ensures understanding among work teams involved.</p>
2. Plan and manage resource acquisition	<p>2.1. Strategies are developed and implemented to ensure that employees are recruited and/or inducted within the organization's human resources management policies and practices.</p> <p>2.2. Strategies are developed and implemented to ensure that physical resources and services are acquired in accordance with the organization's policies, practices and procedures.</p>

3. Monitor and review operational performance	<p>3.1. Performance systems and processes are developed, monitored and reviewed to assess progress in achieving profit and productivity plans and targets.</p> <p>3.2. Budget and actual financial information is analyzed and interpreted to monitor and review profit and productivity performance.</p> <p>3.3. Areas of underperformance are identified, solutions recommended, and prompt action taken to rectify the situation.</p> <p>3.4. Systems are planned and implemented to ensure that mentoring and coaching are provided to support individuals and teams to effectively, economically and safely use resources.</p> <p>3.5. Recommendations are negotiated for variations to operational plans and approval is gained from designated persons/groups.</p> <p>3.6. Systems are developed and implemented to ensure that procedures and records associated with documenting performance are managed in accordance with organizational requirements.</p>
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Variable	Range
Resource requirements	may include: <ul style="list-style-type: none"> • goods and services to be purchased and ordered • human, physical and financial resources - both current and projected • stock requirements and requisitions
Relevant personnel, colleagues and specialist resource managers	may include: <ul style="list-style-type: none"> • employees at the same level or more senior managers • managers • occupational health and safety committee/s and other people with specialist responsibilities • supervisors • union or employee representatives
Consultation processes	may refer to: <ul style="list-style-type: none"> • 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 • mechanisms used to provide feedback to the work team in relation to outcomes of consultation • meetings, interviews, brainstorming sessions
Operational plans	may also be termed: <ul style="list-style-type: none"> • action plans • annual plans • management plans • tactical plans

Key performance indicators	<p>may refer to:</p> <ul style="list-style-type: none"> measures for monitoring or evaluating the efficiency or effectiveness of a system which may be used to demonstrate accountability and to identify areas for improvements
Contingency plans	<p>may include:</p> <ul style="list-style-type: none"> contracting out or outsourcing human resources and other functions or tasks diversification of outcomes finding cheaper or lower quality raw materials and consumables increasing sales or production recycling and re-using rental, hire purchase or alternative means of procurement of required materials, equipment and stock restructuring of organisation to reduce labour costs risk identification, assessment and management processes seeking further funding strategies for reducing costs, wastage, stock or consumables succession planning
Organisation's policies, practices and procedures	<p>may include:</p> <ul style="list-style-type: none"> organisational culture organisational guidelines which govern and prescribe operational functions, such as the acquisition and management of human and physical resources Standard Operating Procedures undocumented practices in line with organisational operations
Designated persons/groups	<p>may include:</p> <ul style="list-style-type: none"> groups designated in workplace policies and procedures managers or supervisors whose roles and responsibilities include decision making on operations other stakeholders such as Board members other work groups or teams whose work will be affected by recommendations for variations

Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate knowledge and skills competence to:</p> <ul style="list-style-type: none"> development of an operational plan with details of how it will be implemented and monitored models and methods for operational plans.
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> models and methods for operational plans budgeting processes alternative approaches to improving resource usage and eliminating resource inefficiencies and waste

Underpinning Skills	<p>Demonstrate skills of:</p> <ul style="list-style-type: none"> • literacy skills to access and use workplace information and to write a succinct and practical plan • technology skills to use software to produce and monitor the plan against performance indicators • planning and organisational skills • coaching skills to work with people with poor performance • numeracy skills to allocate and manage financial resources
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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level V	
Unit Title	Manage Project Quality
Unit Code	MIN EDD5 12 0114
Unit Descriptor	This unit specifies the outcomes required to manage quality within projects. It covers determining quality requirements, implementing quality assurance processes, and using review and evaluation to make quality improvements in current and future projects.

Elements	Performance Criteria
1. Determine quality requirements.	<p>1.1 Quality objectives, standards and levels are determined, with input from stakeholders and guidance of a higher project authority, to establish the basis for quality outcomes and a quality management plan.</p> <p>1.2 Established quality management methods, techniques and tools are selected and used to determine preferred mix of quality, capability, cost and time.</p> <p>1.3 Quality criteria are identified, agreed with a higher project authority and communicated to stakeholders to ensure clarity of understanding and achievement of quality and overall project objectives.</p> <p>1.4 Agreed quality requirements are included in the project plan and implemented as basis for performance measurement.</p>
2. Implement quality assurance.	<p>2.1 Results of project activities and product performance are measured and documented throughout the project life cycle to determine compliance with agreed quality standards.</p> <p>2.2 Causes of unsatisfactory results are identified, in consultation with the client, and appropriate actions are recommended to a higher project authority to enable continuous improvement in quality outcomes.</p> <p>2.3 Inspections of quality processes and quality control results are conducted to determine compliance of quality standards to overall quality objectives.</p> <p>2.4 A quality management system is maintained to enable effective recording and communication of quality issues and outcomes to a higher project authority and stakeholders.</p>
3. Implement project quality improvements.	<p>3.1 Processes are reviewed and agreed changes implemented continually throughout the project life cycle to ensure continuous improvement to quality.</p> <p>3.2 Project outcomes are reviewed against performance criteria to determine the effectiveness of quality management processes and procedures.</p> <p>3.3 Lessons learned and recommended improvements are identified, documented and passed on to a higher project authority for application in future projects.</p>

Variable	Range
Quality objectives	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • requirements from the client and other stakeholders • requirements from a higher project authority • negotiated trade-offs between cost, schedule and performance • those quality aspects which may impact on customer satisfaction
Quality management plan	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • established processes • authorizations and responsibilities for quality control • quality assurance • continuous improvement
Quality management methods, techniques and tools	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • brainstorming • benchmarking • charting processes • ranking candidates • defining control • undertaking benefit/cost analysis • processes that limit and/or indicate variation • control charts • flowcharts • histograms • pareto charts • scatter gram • run charts
Quality control	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • monitoring conformance with specifications • recommending ways to eliminate causes of unsatisfactory • performance of products or processes • monitoring of regular inspections by internal or external agents
Improvements	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • formal practices, such as total quality management or continuous improvement • improvement by less formal processes which enhance both the product quality and processes of the project, for example client surveys to determine client satisfaction with project team performance

Evidence Guide			
Critical Aspects of Competence	<p>Demonstrates skills and knowledge in:</p> <ul style="list-style-type: none"> • lists of quality objectives, standards, levels and measurement criteria • records of inspections, recommended rectification actions and quality outcomes • management of quality management system and quality management plans • application of quality control, quality assurance and continuous improvement processes 		
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	<ul style="list-style-type: none"> • records of quality reviews • lists of lessons learned and recommended improvements <p>Processes that could be used as evidence include:</p> <ul style="list-style-type: none"> • how quality requirements and outcomes were determined for projects • how quality tools were selected for use in projects • how team members were managed throughout projects with respect to quality within the project • how quality was managed throughout projects • how problems and issues with respect to quality and arising during projects were identified and addressed • how projects were reviewed with respect to quality management • how improvements to quality management of projects have been acted upon
Underpinning Knowledge and Attitudes	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • the principles of project quality management and their application • acceptance of responsibilities for project quality management • use of quality management systems and standards • the place of quality management in the context of the project life cycle • appropriate project quality management methodologies; and their capabilities, limitations, applicability and contribution to project outcomes • attributes: <ul style="list-style-type: none"> ➤ analytical ➤ attention to detail ➤ able to maintain an overview ➤ communicative ➤ positive leadership
Underpinning Skills	<p>Demonstrate skills of:</p> <ul style="list-style-type: none"> • ability to relate to people from a range of social, cultural and ethnic backgrounds, and physical and mental abilities • project management • quality management • planning and organizing • communication and negotiation • problem-solving • leadership and personnel management • monitoring and review skills
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competence may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Mineral Exploration and Development Drilling Level V	
Unit Title	Facilitate and Capitalize on Change and Innovation
Unit Code	MIN EDD5 13 0114
Unit Descriptor	This unit specifies the outcomes required to plan and manage the introduction and facilitation of change; particular emphasis is on the development of creative and flexible approaches, and on managing emerging opportunities and challenges.

Elements	Performance Criteria
1. Participate in planning the introduction and facilitation of change.	<p>1.1 Manager contributes effectively to the organization's planning processes to introduce and facilitate change.</p> <p>1.2 Plans are made to introduce change in consultation with appropriate stakeholders.</p> <p>1.3 Organization's objectives and plans are communicated effectively to introduce change to individuals and teams.</p>
2. Develop creative and flexible approaches and solutions.	<p>2.1 Variety of approaches are identified and analyzed to manage workplace issues and problems.</p> <p>2.2 Risks are identified and assessed, and action initiated to manage these to achieve a recognized benefit or advantage to the organization.</p> <p>2.3 Workplace is managed in a way which promotes the development of innovative approaches and outcomes.</p> <p>2.4 Creative and responsive approaches to resource management improve productivity and services, and/or reduce costs.</p>
3. Manage emerging challenges and opportunities.	<p>3.1 Individuals and teams are supported to respond effectively and efficiently to changes in the organization's goals, plans and priorities.</p> <p>3.2 Coaching and mentoring are made to assist individuals and teams to develop competencies to handle change efficiently and effectively.</p> <p>3.3 Opportunities are identified and taken as appropriate, to make adjustments and to respond to the changing needs of customers and the organization.</p> <p>3.4 Information needs of individuals and teams are anticipated and facilitated as part of change implementation and management.</p> <p>3.5 Recommendations for improving the methods and techniques to manage change are identified, evaluated and negotiated with appropriate individuals and groups.</p>

Variables	Range
Manager	a person with frontline management roles and responsibilities, regardless of the title of their position

Appropriate stakeholders	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • organization directors and other relevant managers • teams and individual employees who are both directly and indirectly involved in the proposed change • union/employee representatives or groups • OHS committees • other people with specialist responsibilities • external stakeholders where appropriate - such as clients, suppliers, industry associations, regulatory and licensing agencies
Risks	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • any event, process or action that may result in goals and objectives of the organization not being met • any adverse impact on individuals or the organization • various risks identified in a risk management process
Information needs	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • new and emerging workplace issues • implications for current work roles and practices including training and development • changes relative to workplace legislation, such as OHS, workplace data such as productivity, inputs/outputs and future projections • planning documents • reports • market trend data • scenario plans • customer/competitor data

Evidence Guide			
Critical Aspects of Competence	<p>Demonstrates skills and knowledge in:</p> <ul style="list-style-type: none"> • Planning the introduction and facilitation of change • Developing creative and flexible approaches and solutions • Managing emerging challenges and opportunities 		
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • Relevant legislation from all levels of government that affects business operation, especially in regard to occupational health and safety and environmental issues, equal opportunity, industrial relations and anti-discrimination • the principles and techniques involved in: <ul style="list-style-type: none"> • change and innovation management • development of strategies and procedures to implement and facilitate change and innovation • use of risk management strategies: identifying hazards, • assessing risks and implementing risk control measures • problem identification and resolution • leadership and mentoring techniques • management of quality customer service delivery • consultation and communication techniques • record keeping and management methods 		
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	<ul style="list-style-type: none"> • the sources of change and how they impact • factors which lead/cause resistance to change • approaches to managing workplace issues
Underpinning Skills	<p>Demonstrate skills on:</p> <ul style="list-style-type: none"> • Communication skills • Planning work • Managing risk
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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level V	
Unit Title	Establish and Conduct Business Relationships
Unit Code	MIN EDD5 14 0114
Unit Descriptor	This unit covers the skills, attitudes and knowledge required to manage business relationship with customers.

Elements	Performance Criteria
1. Establish contact with customer.	<p>1.1 Welcoming customer environment is maintained.</p> <p>1.2 Customer is greeted warmly according to enterprise policies and procedures.</p> <p>1.3 Effective service environment is created through verbal and non-verbal presentation according to enterprise policies and procedures.</p> <p>1.4 Customer data is maintained to ensure database relevance and currency.</p> <p>1.5 Information on customers and service history is gathered for analysis.</p> <p>1.6 Opportunities to maintain regular contact with customers are identified and taken up.</p>
2. Clarify needs of customer.	<p>2.1 Customer needs are determined through questioning and active listening.</p> <p>2.2 Customer needs are accurately assessed against the products/services of the enterprise.</p> <p>2.3 Customer details are documented clearly and accurately in required format.</p> <p>2.4 Negotiations are conducted in a business-like and professional manner.</p> <p>2.5 Maximize benefits for all parties in the negotiation through use of established negotiation techniques and in the context of establishing long term relationships.</p> <p>2.6 The results of negotiations are communicated to appropriate colleagues and stakeholders within appropriate timeframes.</p>
3. Provide information and advice.	<p>3.1 Features and benefits of products/services provided by the enterprise are described / recommended to meet customer needs.</p> <p>3.2 Information is provided to satisfy customer needs.</p> <p>3.3 Alternative sources of information/advice are discussed with the customer.</p>
4. Foster and maintain	<p>4.1 Pro-actively seek, review and act upon information needed to maintain sound business relationships.</p>

business relationships.	<p>4.2 Agreements are honored within the scope of individual responsibility.</p> <p>4.3 Adjustments to agreements are made in consultation with the customer and share information with appropriate colleagues.</p> <p>4.4 Nurture relationships through regular contact and use of effective interpersonal and communication styles.</p>
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Variables	Range
Opportunities to maintain regular contact with customers	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • informal social occasions • industry functions • association membership • co-operative promotions • program of regular telephone contact
Negotiation techniques	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • identification of goals, limits • clarification of needs of all parties • identifying points of agreement and points of difference • preparatory research of facts • active listening and questioning • non-verbal communication techniques • appropriate language • bargaining • developing options • confirming agreements • appropriate cultural behavior

Evidence Guide	
Critical Aspects of Competence	<p>Demonstrates skills and knowledge in:</p> <ul style="list-style-type: none"> • consistently applying enterprise policies and procedures and industry codes of practice in regard to customer service • providing a quality service environment by treating customers in a courteous and professional manner through all stages of the procedure • using effective questioning/active listening and observation skills to identify customer needs • communicating effectively with others involved in or affected by the work • maintaining relevant and current customer databases in accordance with enterprise policies and procedures • ability to build and maintain relationships to achieve successful business outcomes
Underpinning Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • Operational knowledge of enterprise policies and procedures in regard to: <ul style="list-style-type: none"> ➢ customer service ➢ dealing with difficult customers

	<ul style="list-style-type: none"> ➤ maintenance of customer databases ➤ allocated duties/responsibilities ➤ General knowledge of the range of enterprise merchandise and services, location of telephone extensions and departments/sections <ul style="list-style-type: none"> • Basic operational knowledge of legislation and statutory requirements, including consumer law, trade practices and fair trading legislation • Basic operational knowledge of industry/workplace codes of practice in relation to customer service • negotiation and communication techniques appropriate to negotiations that may be of significant commercial value
Underpinning Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • Use workplace technology related to use of customer database • Collect, organize and understand information related to collating and analyzing customer information to identify needs • Communicate ideas and information • Plan and organize activities concerning information for database entries • Use mathematical ideas and techniques to plan database cells and size • Establish diagnostic processes which identify and recommend improvements to customer service
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	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • 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: Mineral Exploration and Development Drilling Level V	
Unit Title	Manage Continuous Improvement Process (Kaizen)
Unit Code	MIN EDD5 15 0114
Unit Descriptor	This unit describes the performance, outcomes, knowledge, attitude and skills required to sustain and develop an environment in which continuous improvement, innovation and learning are promoted, rewarded and managed.

Elements	Performance criteria
1. Diagnose the current status.	1.1 Parameters used for study current situation are obtained. 1.2 Internal and external environment is analyzed. 1.3 Problems related to targeted environment is recognized and identified. 1.4 Problems regarding to current situation are analyzed. 1.5 Alternatives are generated. 1.6 Best alternatives are selected.
2. Design an effective continuous improvement process (kaizen).	2.1 The values, mission and goals of kaizen management system are clarified. 2.2 The kaizen management template and a visual management logo full of purpose and meaning are developed. 2.3 A clear action strategy (master and detailed plans) is defined. 2.4 The most effective and proven kaizen tools are chosen and applied. 2.5 A practical way is identified to involve all employees in Gemba activities (top, middle and bottom).
3. Develop change capability.	3. 1. Kaizen Promotion Team Structure is developed. 3. 2. The Kaizen Training Plan is defined and started. 3. 3. Supervisors' kaizen capability and habits are developed. 3. 4. Key people are developed in terms of Individual leadership capability .
4. Implement improved processes.	4.1 Sustainability/continuous improvement are promoted as an essential part of doing business. 4.2 Impacts of change and consequences are addressed for people, and transition plans implemented. 4.3 Objectives, time frames, measures and communication plans are ensured in place to manage implementation. 4.4 Contingency plans are implemented in the event of non-performance.

	<p>4.5 Failure is followed-up by prompt investigation and analysis of causes.</p> <p>4.6 Emerging challenges and opportunities are managed effectively.</p> <p>4.7 Continuous improvement systems and processes are evaluated regularly.</p> <p>4.8 Improvements are communicated to all relevant groups and individuals.</p> <p>4.9 Opportunities are explored for further development of value stream improvement processes.</p>
5. Establish direction and control.	<p>5.1 A system audit tool is defined and implemented.</p> <p>5.2 The kaizen management system is deployed across all company levels and functions.</p> <p>5.3 Results are checked and corrections made.</p> <p>5.4 Standard operating procedures are developed and maintained.</p> <p>5.5 The recruit, training and evaluation systems are improved and HR practices compensated.</p>

Range	Variables
Parameters	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Working condition • Resources may include: <ul style="list-style-type: none"> ➢ Human ➢ Material ➢ Machine • Kaizen elements
Kaizen management template	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Visual management board for: <ul style="list-style-type: none"> ➢ displaying characteristic figures, data and graphics ➢ depicting and controlling processes ➢ identifying and marking sources of risks, setting and standards ➢ displaying company's values and goals of kaizen
Kaizen tools	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • 5S (a visual workplace management) • 7 QC tools(Cause and Effect Diagram, Check Sheet , Pareto Diagram , Histogram, Scatter Diagram, Control Chart and Flow Chart) • Brainstorming • Basic Industrial Engineering (IE) tools such as time study, motion study, line balancing, work sampling • JIT(JUST IN TIME principles) • MUDA identification and elimination tools • Kanban

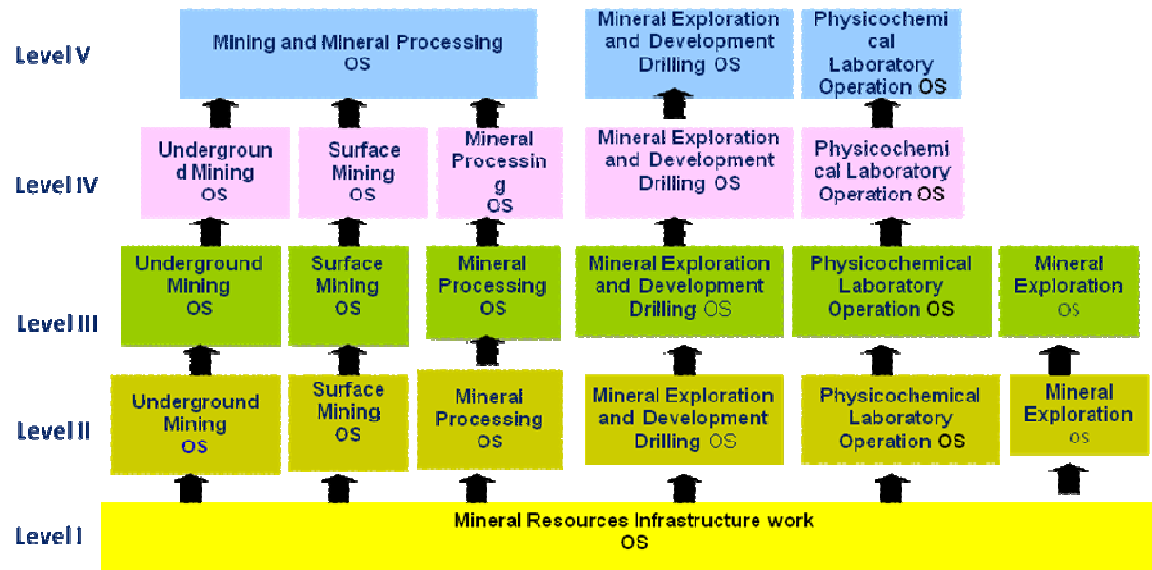
	<ul style="list-style-type: none"> • Poka-yoke • Takt- time
Gemba activities	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Value-adding activities to satisfy the customer • Employee autonomous operations (participating in team to identify nonconformity, propose solutions and implement them autonomously)
Individual leadership capability	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Personal and interpersonal skills • Courage • Honour and integrity • Energy and drive • Strategic skills • Operating skills • Organizational positioning skills
Sustainability/continuous improvement	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Improvements made by following PDCA (Plan, Do, Check and Act) cycle for: <ul style="list-style-type: none"> ➢ Improvements in one's own work ➢ Saving in energy, material and other resources ➢ Improvements in the working environment ➢ Improvements in machines and processes ➢ Improvements in jigs and tools ➢ Improvement in office work ➢ Improvements in product quality ➢ Ideas for new products ➢ Customers services and customer relations
System audit tool	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • 5S audit • Patrol system • Kaizen board • 5M check lists • Key Performance Indicators (KPIs)
Standard operating procedure	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Administrative standards for: <ul style="list-style-type: none"> ➢ Managing the business ➢ Administration ➢ Personnel Guidelines ➢ Job Descriptions ➢ Guidelines for preparing cost information • Operation standards for: <ul style="list-style-type: none"> ➢ Describing the way a job is done. ➢ Help realising Quality, cost, delivery. ➢ Addressing the need to satisfy customers. ➢ Using the process that's the best. ➢ Producing work in the most cost effective manner. ➢ Assuring total quality for the customer.
HR practices	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Resources may include:

	<ul style="list-style-type: none"> ➤ Recruit and retain high quality people with innovative skills and a good track, record in innovation • HR development is used for: <ul style="list-style-type: none"> ➤ strategic capability and provide encouragement and facilities for enhancing innovating skills and enhancing the intellectual capital of the organization • Reward will: <ul style="list-style-type: none"> ➤ Provide financial incentives and rewards and recognition for successful innovation
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Evidence Guide			
Critical Aspects of Assessment	<p>Demonstrates skills and knowledge competencies to:</p> <ul style="list-style-type: none"> • Establish policy and cross-functional goals for kaizen • Deploy and implement goals as directed through policy deployment and cross-functional management. • Realize goals through deployment and audits. • Build systems, procedures, and structures conducive to kaizen. • Use kaizen in functional capabilities. • Introduce Kaizen as a corporate strategy • Provide support and direction between allocating resources • Establish, maintain and upgrade standards. • Make employees conscious through training programs. • Assist employees develop skills and tools for problem solving. 		
Underpinning Knowledge and Attitude	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • Quality management and continuous improvement theories • creativity/innovation theories/concepts • competitive systems and practices tools, including: <ul style="list-style-type: none"> ➤ 5S ➤ JUST IN Time (JIT) ➤ mistake proofing ➤ process mapping ➤ establishing customer pull ➤ setting of KPIs/metrics ➤ SOP ➤ Kaizen elements/targets. ➤ identification and elimination of waste/MUDA ➤ continuous improvement processes including implementation, monitoring and evaluation strategies for a whole organization and its value stream ➤ Difference between breakthrough improvement and continuous improvement ➤ organizational goals, processes and structure ➤ approval processes within organization ➤ methods of determining the impact of a change ➤ customer perception of value ➤ Define, Measure, Analyze, Improve and Control (DMAIC) to sustain process 		
Underpinning Skills	Demonstrates Skills to:		
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	<ul style="list-style-type: none"> • Use leadership skills to foster a commitment to quality and openness to improvement. • Analyze training needs and implementing training programs • Prepare and maintain quality and audit documentation • Undertake self-directed problem solving and decision-making on issues of a broad and/or highly specialized nature and in highly varied and/or highly specialized contexts • Communicate at all levels in the organization and to audiences of different levels of literacy and numeracy • Analyze current state/situation of the organization. • Analyze individually and collectively the implementation of competitive systems and practices tools in the organization and determining strategies for improved implementation • Solve highly varied and highly specialized problems related to competitive systems and practices implementation and continuous improvement to root cause • Negotiate with stakeholders, where required, to obtain information required for implementation and refinement of continuous improvements, including management, unions, employees and members of the community. • Review relevant metrics, including all those measures which might be used to determine the performance of the improvement system, including: <ul style="list-style-type: none"> ➢ Key Performance Indicators (KPIs) for existing processes ➢ Quality statistics ➢ Delivery timing and quantity statistics ➢ Process/equipment reliability ('uptime')
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: <ul style="list-style-type: none"> • 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

The Federal TVET Agency values your feedback of the document.
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