

NATIONAL OCCUPATIONAL STANDARD



# DRILLER



MINING INDUSTRY  
HUMAN RESOURCES COUNCIL

## INTRODUCTION

National Occupational Standards (NOS) establish clear, objective benchmarks of the skills and knowledge required for workers to perform in a particular occupation. Each NOS reflects a complete list of competencies required to perform a specific job.

The Mining Industry Human Resources Council (MiHR) developed and maintains a suite of seven NOS for the Canadian mining industry. The development and maintenance of each NOS is led by a National Occupational Standard Development Committee (NOSDC) made up of

subject-matter experts from various groups across Canada, including industry, labour and education. NOS development committees undertake a regular review (every three to five years) of the NOS to ensure they remain current and relevant to industry.

For more information on the NOS or our Canadian Mining Skills Development Strategy, please visit [mihr.ca/standards-training-recognition](http://mihr.ca/standards-training-recognition) or email [standards@mihr.ca](mailto:standards@mihr.ca).

## UNDERSTANDING THE NOS

Each National Occupational Standard reflects a complete list of competencies required to perform a specific job. All areas of competence and their tasks for the entire suite of seven NOS have been pulled together in MiHR's Master Competency List. The Master Competency List allows you to understand those competencies and tasks that are common across multiple occupations versus the specialties that set them apart.

Competency areas that are common across multiple occupations within the mining industry are referred to as common competencies. They are the foundational competencies and skills required to work in the mining industry, and include tasks such as working safely, and knowledge of workplace policies and legislation.

Each NOS builds on the common competencies by including additional competencies that are unique to each occupation. Both types of

competencies are referenced in the NOS document with multiple tasks and sub-tasks to provide a deeper context and understanding of each area of competency. Each task is further defined by its general frequency. References and examples of abilities and knowledge are included to ensure adequate interpretation of each sub-task.

MiHR's Master Competency List reflects all areas of competency for MiHR's suite of NOS and each area of competency and its related tasks keep the same identification number regardless of the NOS in which they are included.

Should an area of competency or task not be included in an NOS, the related details for that area of competency or task will not be present in the NOS. In its place, there will be an indication that the task is not applicable to this NOS.

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## Area of Competency 1: Policies and Legislation

 **TASK 1.1**  
**COMPLY WITH COMPANY POLICIES AND PROCEDURES**

 **SUB-TASK**

1. Understand, sign off and follow company policies and procedures.

 **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Includes Standard Operating Procedures (SOP)
- Includes policies on the use of personal electronic devices, wearing jewellery, contact lenses, long hair, etc.
- Includes procedures on operation of equipment, use and handling of chemicals, care and maintenance of sumps and ventilation.
- Understand and apply human resource policies, procedures and collective bargaining agreements.
- Comply with drug and alcohol policy.
- Comply with updates and revisions to policies and procedures.

 **TASK 1.2**  
**UNDERSTAND AND COMPLY WITH APPLICABLE WORKPLACE LEGISLATION AND REGULATIONS**

 **SUB-TASK**

1. Understand and follow work processes mandated by legislation and regulations.

 **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Includes Mine Health and Safety Act and Regulations, Workers' Compensation Regulations, Labour Standards, Hoisting Regulations, Environmental legislation, Explosive Regulations.
- Comply with updates and revisions to legislation and regulations.

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## Area of Competency 2: Work Safely



## TASK 2.1

# SELECT, USE AND MAINTAIN PERSONAL PROTECTIVE EQUIPMENT (PPE)

### ✓ SUB-TASKS

1. Recognize situations that require use of PPE.
2. Select, inspect, use, maintain and store appropriate PPE for:
  - Head protection
  - Eye protection
  - Foot protection
  - Hand protection
  - Hearing protection
  - Respiratory protection
  - High-visibility clothing and apparel
  - Specific conditions (fall protection, welding, radiation, handling chemicals, energized work, roasting)
3. Wear clothing appropriate for work conditions and tasks.
4. Follow site, provincial and territorial standards.
  - Practice personal hygiene.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Select appropriate PPE.
  - Wear PPE approved by recognized authority (Canadian Standards Association (CSA), American National Standards Institute (ANSI), Underwriters Laboratories (UL)).
  - Identify limitations of PPE.
  - Workers may not be aware of approved PPE and/or the PPE may be assigned by the company.
  - Contractors can be required to select their own PPE.
  - Ensure PPE is appropriate for the assigned work task.
- Inspect PPE.
  - Inspect PPE for wear, damage and defects before using.
  - Replace worn, damaged or defective PPE.
  - Report defects to appropriate personnel.
- Use PPE.
  - Ensure PPE fits correctly and is adjusted properly.
  - Follow manufacturer's instructions and specifications for proper use and maintenance of PPE.
  - Maintain and store PPE.
- Wear clothing appropriate for work conditions and tasks.
  - Do not wear loose or torn clothing.
  - Ensure all clothing adequately covers body to protect against hazards, contaminants, work and weather elements.
  - Dispose of contaminated clothing in compliance with company policies and legislation.
  - Use appropriate eye protection in place of contact lenses.
  - Wear high-visibility PPE as required.
- Practice personal hygiene.
  - Keep work clothes separate from street clothes if required.
  - Change and clean work clothes regularly.



## TASK 2.2

# PRACTICE AND MAINTAIN GOOD HOUSEKEEPING

### ✓ SUB-TASKS

1. Maintain clean work area.
2. Use appropriate equipment for task.
3. Take corrective action as required.
4. Appropriately dispose of waste materials safely.
5. Organize and classify materials, supplies and equipment.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Maintain clean work area.
  - Ensure priority areas are clear first as identified in policies and procedures.
  - Keep work areas free from clutter.
  - Keep work areas free of ice, grease and mud.
- Use appropriate equipment for task (e.g., broom, scraper, water hose, vacuum, blow pipe or air lance, mobile equipment).
  - Clean, maintain and return tools and equipment to storage immediately after use.
  - Report, tag out and/or remove defective equipment.
- Take corrective action as required.
  - Clean all spills and/or leaks.
  - Install signs and barricades as required.
  - Ensure work area is free of obstructions.
- Dispose of waste materials.
  - Follow environmental plan.
- Organize and classify materials.
  - Use shadow boards for storing equipment.
  - Use tool cribs, bins and dedicated areas for storing similar materials.



## TASK 2.3

# IDENTIFY AND RESPOND TO WORKPLACE HAZARDS

### ✓ SUB-TASKS

1. Recognize hazardous or potentially hazardous conditions.
2. Observe safety precautions in hazardous conditions.
3. Take corrective action.
  - If hazardous condition cannot be immediately corrected: put up signs, barricade area or post guard, lock out and tag and de-energize.
4. Record and report all hazardous or potentially hazardous conditions to appropriate personnel.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Recognize hazardous or potentially hazardous conditions.
  - Use risk assessment tools as per site policies and procedures.
  - Follow water management plans.
  - Types of hazardous conditions may include: dangerous weather and environmental conditions, heat and cold stress, wildlife, poor ground conditions (loose rock, swamp, ice), overhead hazards (trees, power lines, screen, vent tubing), underground hazards (gas lines, power lines), open holes (sumps, chutes, shafts, trapdoors, hoist pits, ladder ways), protruding objects (nails, anchors), tripping or slipping hazards (hoses, rocks, muck, ice, lichen, spills), moving equipment (trucks, loaders, forklifts, aircraft), explosives (dangerous gases, e.g., oxy-acetylene, methane, propane, H<sub>2</sub>S, HCN, chlorine), inadequate ventilation (ripped or torn vent tubing, non-operating fans), lack of or inadequate safety guards on equipment with moving or rotating parts, energy sources, reagents, engulfment, potential chemical reactions, dust, confined space, flocculants.
- Take corrective action.
  - Isolate hazard or potential hazard.
  - Guard all identified hazards using barricades and signs.
  - Post guard, if required.
  - Stop work if there are unsafe conditions.
  - Complete job hazard analysis.
  - Evacuate area if necessary.
- If hazardous condition cannot be immediately corrected.
  - Put up signs, barricade area or post guard.
  - Ensure safety of self and others.
  - Lock out, tag and de-energize as per site policies and procedures.



## TASK 2.4 MANUALLY LIFT AND CARRY MATERIALS

### ✓ SUB-TASKS

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. Assess the load.</li> <li>2. Inspect pathway and destination.</li> <li>3. Prepare to lift the load.</li> </ol> | <ol style="list-style-type: none"> <li>4. Make the lift.</li> <li>5. Carry the load.</li> <li>6. Ground the load.</li> </ol> |
|--|--|

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Assess the load.                     <ul style="list-style-type: none"> <li>- Estimate and identify size, weight, center of gravity and dimensions of load.</li> <li>- Assess load and understand Musculoskeletal Disorder (MSD).</li> <li>- Determine if assistance is required.</li> <li>- Determine if mechanical lifting equipment is needed.</li> </ul> </li> <li>• Inspect pathway and destination.                     <ul style="list-style-type: none"> <li>- Identify and remove hazards, where possible.</li> <li>- Identify resting places, if needed.</li> <li>- Ensure clear path to travel.</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Prepare to lift the load.                     <ul style="list-style-type: none"> <li>- Work within personal physical limits and limits identified in policies and procedures.</li> <li>- Ensure good footing and well-balanced stance.</li> <li>- Select safe and comfortable hand holds.</li> <li>- Grip with full palm of hand.</li> <li>- Use sit down position and keep back straight.</li> </ul> </li> <li>• Make the lift.                     <ul style="list-style-type: none"> <li>- Ensure back is kept straight, use leg muscles to lift.</li> <li>- Use proper lifting technique to avoid muscular skeletal injuries.</li> <li>- Ground the load.</li> <li>- Keep back straight and use leg muscles to lower load.</li> </ul> </li> </ul> |
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## TASK 2.6 WORK AROUND MOBILE EQUIPMENT

### ✓ SUB-TASKS

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Work in authorized locations only.</li> <li>2. Communicate with equipment operator.</li> </ol> | <ol style="list-style-type: none"> <li>3. Obey rules of conduct.</li> <li>4. Avoid hazardous conditions.</li> </ol> |
|--|---|

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Communicate with equipment operator.                     <ul style="list-style-type: none"> <li>- Communicate with equipment operator/skip tender/cage tender/dispatch and verify acknowledgement.</li> <li>- Be aware of locations of communication equipment.</li> <li>- Use hand signals.</li> </ul> </li> <li>• Obey rules of conduct.                     <ul style="list-style-type: none"> <li>- Maintain safe working distance and loads in tow.</li> <li>- Obey vehicle warning signals and alarms.</li> <li>- Yield the right of way.</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Avoid hazardous conditions.                     <ul style="list-style-type: none"> <li>- Use designated travel ways around equipment.</li> <li>- Stay clear of suspended loads.</li> <li>- Avoid blind spots, remain visible.</li> <li>- Do not cross guards or barricades.</li> <li>- Recognize and utilize safety bays.</li> <li>- Be aware of trailing cables.</li> <li>- Obey signage and established right of way policies.</li> </ul> </li> </ul> |
|---|--|

## **TASK 2.7** **WORK AROUND STATIONARY EQUIPMENT**

### **SUB-TASKS**

1. Work in authorized locations only.
2. Communicate with equipment operator.
3. Obey rules of conduct.
4. Avoid hazardous conditions.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Work in authorized locations only.
  - Including but not limited to: drill, pumps, pneumatic equipment, high pressure hoses and generators, ensuring guards are in place.
  - Work from safe location.
- Obey rules of conduct.
  - Maintain safe working distance.
  - Observe alarms and warning systems.
  - Communicate with co-workers.
- Avoid hazardous conditions.

## **TASK 2.8** **WORK AROUND WATER HAZARDS**

### **SUB-TASKS**

1. Operate equipment safely in and around water hazards.
2. Ensure safety of personnel working around water hazards.
3. Identify type of water hazard.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Operate equipment safely in and around water hazards.
  - Follow legislation and company policies and procedures as outlined.
  - Collect samples from tailings pond.
  - Utilize appropriate fall protection.
  - Use re-claim pumps.
  - Maintain berms.
- Ensure safety of personnel working around water hazards.
  - Use personal floatation devices (PFDs).
  - Monitor water levels.
  - Adhere to environmental standards.
  - Perform dam monitoring.
- Identify type of water hazard.

## **TASK 2.9** **WORK AROUND AIRCRAFT AND HELICOPTERS**

### **SUB-TASKS**

1. Complete orientation, provided by company and/or pilot.
2. Ensure personal safety.
3. Be aware of hazards.
4. Complete training in sending and receiving loads.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Ensure personal safety.
  - Wear hard hats with straps, earmuffs and goggles.
  - Carry tools and equipment at or below waist level.
- Keep within visual range of pilot.
  - Be aware of hazards.
  - Be aware of power of rotary wash, debris, rotors.
  - Keep clear of propellers, do not walk under wings.
- Complete training in sending and receiving loads.
  - Review of sign-offs.
  - Proof of competency.

## **TASK 2.11** **PREPARE FOR HOT WORK**

### **SUB-TASKS**

1. Recognize requirements for a hot work environment and obtain necessary permits.
2. Inform appropriate personnel for fire watch.
3. Prepare the site.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Recognize requirements for a hot work environment and obtain necessary permits.
  - Welding, cutting, grinding, soldering, using electrical equipment not suitable for a hazard location, combustible engine, “frost fighting”.
- Inform appropriate personnel for fire watch.
  - Post guard and check environment after work as per site policies and procedures.
- Prepare the site.
- Remove combustibles, wet down the area, ensure necessary firefighting equipment is present.
- Follow site policies and procedures.
- Ensure proper ventilation.

## **TASK 2.12** **RECOGNIZE AUTHORIZED AND RESTRICTED AREAS**

### **SUB-TASKS**

1. Recognize hazardous areas.
2. Complete necessary training for entry to authorized and restricted areas.
3. Follow entry and exit protocols.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Recognize hazardous areas.
  - Examples include: reagent room, electrical rooms, leach plant, hot work, confined spaces, explosive magazines, active lifting areas.
- Complete necessary training for entry to authorized and restricted areas.
  - Training could include applicable respiratory protection training (e.g., SCBA), WHMIS, Transportation Dangerous Goods, Arc flash training.
- Follow entry and exit protocols.
  - Follow notification process.
  - Utilize sign-in, sign-out sheets.



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## Area of Competency 3: Signs, Barricades, Traffic, Plans and Drawings

## **TASK 3.1** **RECOGNIZE AND COMPLY WITH SIGNAGE, BARRICADES, AUDIBLE ALARMS AND EQUIPMENT LIGHT INDICATORS**

### **SUB-TASKS**

1. Recognize and comply with signage.
2. Recognize and comply with barricades.
3. Recognize equipment and system audible and visual alarm signals.
4. Recognize equipment and system indicator lights.
5. Do not alter or remove warning signs, lights, audible alarms or barricades, without proper authorization.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Recognize and comply with signage.
  - Includes informational signs and tags, cautionary and danger signs (e.g., electrical hazard), directional signs, labels (e.g., Workplace Hazardous Information System (WHMIS)).
- Recognize and comply with barricades.
  - Includes cautionary tape, danger/do not enter tape, physical barriers (i.e., berms, concrete stoppers, steel cable) and protective barriers (i.e., snow fence, environmental).
- Recognize equipment and system audible and visual alarm signals.
  - Includes bells, buzzers, horns, whistles, sirens, shaft signals.
  - Includes ready lights, fault indicators, emergency indicators.
- Recognize equipment and system indicator lights.
  - Includes shaft warning lights, open hole lights, transportation of explosives, strobe light, equipment audible alarms, blast warning signs and lights, gaseous alarms, equipment start up, mixing alarms, amperes meter, pressure gauges, fault finder alarms.

## **TASK 3.3** **INSTALL, REMOVE, MAINTAIN AND STORE SIGNS AND BARRICADES**

### **SUB-TASKS**

1. Select correct sign/barricade for specific application (e.g., unsafe walkway, open hole).
2. Follow site policy and procedure for posting/installing signs and barricades.
3. Maintain and store signs and barricades in proper locations.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- No additional references or examples.



## TASK 3.4

# RECOGNIZE AND COMPLY WITH TRAFFIC MANAGEMENT PLANS

### ✓ SUB-TASKS

1. Recognize traffic signs and lights.
2. Comply with traffic rules and patterns.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Recognize traffic signs and lights.
  - Includes: traffic signs, blasting signs, directional signs, restricted area signs.
- Comply with traffic rules and patterns.
  - Includes: traffic lights, restricted traffic area, right of way, right- and left-hand drive areas, emergency vehicle movement.
  - Follow site policies and procedures (e.g., call-in protocols, ramp protocols, designated parking).



## TASK 3.5

# UNDERSTAND AND USE INFORMATION PRESENTED ON PLANS AND DRAWINGS

### ✓ SUB-TASKS

1. Recognize symbols, abbreviations, colour coding.
2. Interpret drawings.
3. Recognize and comply with Emergency Response Drawings.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Recognize symbols, abbreviations, colour coding.
  - Includes direction, scale, elevation, depth.
- Interpret drawings.
  - Includes blueprints, P&ID (piping and instrumentation diagram), drill layout patterns, evacuation routes, shaft compartments, services (e.g., air, water, ventilation).

DRILLER

Area of Competency 4:  
Fire Safety

## **TASK 4.1** **BE PREPARED TO RESPOND TO FIRES**

### **SUB-TASKS**

1. Classify fires by hazard.
2. Know location of fire extinguishers and fire hoses.
3. Demonstrate knowledge of components and use of fire extinguishers.
4. Inspect fire extinguishers and keep up to date.
5. Report all discharged or defective fire extinguishers to appropriate personnel.
6. Demonstrate knowledge of equipment fire suppression system.
7. Know location of emergency evacuation/in-evacuation/muster points.
8. Knowledge of location of fire suppression activation points.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Classify fires by hazard.
  - Rubber, compressor rooms, electrical, grease, oil, equipment, chemical, concentrate.
- Demonstrate knowledge of components and use of fire extinguishers.
  - Identify classes of fires: A - paper, wood, trash; B - flammable liquids, lubricants, paints; C - electrical; D - combustible metals.
  - Recognize potential for explosion (e.g., equipment fire, tire fire).
  - Identify standard types, sizes and applications of fire extinguishers.
- Identify names and functions of principal components of fire extinguishers.
- Identify ranges and limitations of fire extinguishers.
- Understand safety precautions for fire extinguishers, including CO2 hazards due to misuse.
- Demonstrate knowledge of equipment fire suppression system.
  - Activate fire suppression system.
  - Ability to dismount safely after activation if needed.

## **TASK 4.2** **EXTINGUISH MINOR FIRES\*, IF SAFE TO DO SO**

### **SUB-TASKS**

1. Report all fires and discharged or defective fire extinguishers to appropriate personnel.
2. Know location of emergency evacuation/in-evacuation/muster points.
3. Select and use appropriate fire extinguisher and/or suppression equipment.
4. Use proper fire extinguishing techniques.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Select and use appropriate fire extinguisher and/or suppression equipment.
  - 10- or 20-pound extinguisher.
  - Fire suppression system.
  - Know manual bypass of suppression system.
- Use proper fire extinguishing techniques.
  - P.A.S.S. (Pull, Aim, Squeeze and Sweep).
  - Follow operational instructions.

*\*Excluding battery fires, report to appropriate personnel.*

## **TASK 4.3** **FIRE PREVENTION**

### **SUB-TASKS**

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Properly store combustible materials.</li> <li>2. Proper maintenance of equipment.</li> </ol> | <ol style="list-style-type: none"> <li>3. Control sources of flame/ignition.</li> <li>4. Safely operate open flame and hot work equipment.</li> </ol> |
|---|---|

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Properly store combustible materials.</li> <li>• Combustible wastes in covered bins or other designated containers.</li> <li>• Oily rags, oil, empty grease tubes, wastepaper, coal, sulfide, wood and timber.</li> <li>• Proper maintenance of equipment.                         <ul style="list-style-type: none"> <li>- Ensure fire suppression is intact.</li> <li>- Clean grease buildup.</li> <li>- Clean diesel filters.</li> <li>- Do not overfill fluid levels.</li> </ul> </li> <li>• Control sources of flame/ignition.                         <ul style="list-style-type: none"> <li>- Cigarettes, sparks, electrical discharges, friction, foreign material near exhaust, open flame.</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Safely operate open-flame and hot work equipment.                         <ul style="list-style-type: none"> <li>- Includes: acetylene torch, tiger torch, coil torch, diesel heater and stove.</li> <li>- Refer to company hot work policies and procedures.</li> <li>- Follow manufacturer's instructions for use (e.g., use for intended purpose only, follow lighting and extinguishing procedures, follow re-fueling procedures, adhere to maintenance procedures and inspections).</li> <li>- Have appropriate class of fire extinguisher available.</li> </ul> </li> </ul> |
|--|--|

## **TASK 4.4** **BE PREPARED FOR WILDFIRES**

### **SUB-TASKS**

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Demonstrate knowledge of wildfire procedures.</li> <li>2. Demonstrate knowledge and use of appropriate equipment.</li> </ol> | <ol style="list-style-type: none"> <li>3. Track fire warnings.</li> <li>4. Report wildfires.</li> </ol> |
|--|---|

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Demonstrate knowledge of wildfire procedures.                         <ul style="list-style-type: none"> <li>- Surrounding area cleared of flammable debris.</li> <li>- Adequate supply of water.</li> <li>- Understand definition of forest area.</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Demonstrate knowledge and use of appropriate equipment.                         <ul style="list-style-type: none"> <li>- Serviceable shovel, axe, back pump with fire hose.</li> </ul> </li> <li>• Use spark arrestor or muffler.</li> <li>• If discharging a firearm, leave no residue.</li> <li>• Do not place hot saw on flammable material.</li> <li>• No smoking while walking or working in a forest area during fire season.</li> </ul> |
|--|---|

# DRILLER

## Area of Competency 5: Emergency Situations



## TASK 5.1

# PREPARE FOR EMERGENCY SITUATIONS AND CONDITIONS

### ✓ SUB-TASKS

1. Know the locations of emergency evacuation/in-evacuation/muster points.
2. Know the locations of fire extinguishers, hoses, equipment.
3. Know the location of first aid kits, stations and attendants.
4. Know the location of and how to use eye wash stations, emergency showers, Safety Data Sheets (SDS), respiratory protection (e.g., self-contained breathing apparatus (SCBA), self-rescuer), gas detectors.
5. Know the location of emergency tents, escape way locations, routes and markings, refuge stations.
6. Know the location of equipment emergency stop devices.
7. Know the location of spill kits.
8. Know the emergency procedures.
9. Know emergency reporting protocols.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Know the location of equipment emergency stop devices.
  - E.g., pull cord on conveyors, fuel shut offs, positive air shut offs, AED equipment.
- Know the emergency procedures.
  - E.g., alarm procedure, communication protocol and emergency response.
  - Emergency contact number, appropriate radio channel to report emergency.



## TASK 5.2

# COMPLY WITH WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEMS (WHMIS)

### ✓ SUB-TASKS

1. Identify hazard symbol classifications.
2. Access, understand and follow SDS instructions.
3. Maintain WHMIS certification.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Identify hazard symbol classifications.
  - Hazard symbols include: Class A: compressed gas; Class B: flammable and combustible material; Class C: oxidizing material; Class D: poisonous and infectious material; Class E: corrosive material; Class F: dangerously reactive materials.
- Access, understand and follow SDS instructions.
  - Knowledge of location of further instructions and key contact personnel.



## **TASK 5.3** **PARTICIPATE IN SAFETY PROGRAMS**

### ✓ **SUB-TASKS**

1. Attend and participate in safety meetings.
2. Follow company safety initiatives.
3. Management of change.

### ✓ **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Attend and participate in safety meetings.
  - Identify types of safety meetings (site orientation, work area orientation, toolbox meeting, joint health and safety committee meeting).
- Follow company safety initiatives.
  - Safety initiatives include (zero harm, five-point safety, behavioural-based safety).
  - Implement safety practices such as Internal Responsibility System (IRS), Job Task Observations.
  - Conduct risk assessments.
- Management of change.
  - Understand and participate in development safety protocols and documents including but not limited to JHA, JHC.

## **TASK 5.4** **UNDERSTAND, RESPOND TO AND REPORT EMERGENCIES**

### ✓ **SUB-TASKS**

1. Understand and properly respond to all emergencies.
2. Report all incidents/emergencies, as per company policies.
3. Secure incident/emergency site.

### ✓ **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Respond to all emergencies.
  - E.g., fire, medical, chemical, equipment, environmental (in-rush of water, major falls of ground, rush of muck), inadvertent stops, stray bells, dogging, high water shaft bottom, power failure.
  - Stay calm and assess the situation.
  - Interpret alarms and other indicators to determine type of emergency and need for evacuation.
  - Activate emergency protocol, release stench gas (if applicable).
  - Follow emergency response plan.
  - Evacuate if necessary.
  - Follow safest escape route.
  - If unable to reach refuge station, barricade self in safe location, ensuring supply of air.
  - Await further instructions.
  - Follow instructions of designated emergency personnel.
- Report and document all emergencies and incidents.
  - Complete all required reports and forms.
  - Report emergency or incident to appropriate personnel according to policies and procedures.
- Secure incident/emergency site.
  - Secure and freeze the scene.
  - Warn others.
  - Activate alarms.
  - Follow communication protocols.
  - Take corrective action if appropriate (e.g., emergency shutdown procedure).

# DRILLER

## Area of Competency 6: Energy Sources



## TASK 6.1

# LOCK OUT, TAG, DE-ENERGIZE AND TEST EQUIPMENT

### ✓ SUB-TASKS

1. Lock out equipment for repair or maintenance as per site policies and applicable regulations.
2. Tag equipment for repair or maintenance as per site policies and applicable regulations.
3. De-energize equipment and verify zero energy state for repair or maintenance.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Lock out equipment for repair or maintenance as per site policies and applicable regulations.
  - De-energize equipment.
  - Ensure safety of self and others.
  - Ensure safety of equipment.
  - Identify types of locks including personal locks, enclosures, multi-locks, lock boxes.
- Lock out and tag for commissioning and testing as per site policies and procedures.
- Electrically powered equipment.
  - Isolate power supply by: disconnecting switch, shutting off breaker, using isolation bar/scissor locks, locking out equipment correctly, attaching required lock to isolation bar/scissor lock, ensuring appropriate key storage and handling.
- Mechanical equipment.
  - Lock out by: ensuring that no material can enter equipment being repaired/maintained, shutting down process as required, shutting off valve nearest flange to be blanked, draining, purging, depressurizing or flushing lines before repair/maintenance to ensure that stored energy is dissipated or contained, locking out valves using chain lock where applicable.
- Tag equipment for repair or maintenance as per site policies and applicable regulations.
  - Identify types of tags, the colours and their use.
  - Complete all required information on tag.
  - Record lock out.
  - Inform appropriate personnel of equipment lock out.
- De-energize equipment and verify zero energy state for repair or maintenance.
  - Ensure zero energy state (ZES) for equipment (e.g., local and remote bump test).



## TASK 6.2

# WORK AROUND ENERGY SOURCES

### ✓ SUB-TASKS

1. Understand and recognize energy sources, stored and potential.
2. Recognize when equipment is locked out and tagged and de-energized.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Recognize energy sources, stored and potential.
  - Mechanical, hydraulic, kinetic, potential, pneumatic, electrical, thermal, chemical, nuclear, overhead and underground services.

# DRILLER

## Area of Competency 7: Working at Heights



## TASK 7.1

# IDENTIFY, INSPECT AND STORE FALL PROTECTION SYSTEMS

### ✓ SUB-TASKS

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Identify possible alternative solutions to engineered controls.</li> <li>2. Identify types of fall protection systems.</li> <li>3. Select suitable fall protection system to match task.</li> </ol> | <ol style="list-style-type: none"> <li>4. Inspect, maintain and store fall protection systems.</li> <li>5. Report and remove defective fall protection systems.</li> <li>6. Complete fall protection training.</li> </ol> |
|---|---|

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Identify types of fall protection systems.                     <ul style="list-style-type: none"> <li>- Handrails, guard rails, travel restraint, fall arrest, anchor points.</li> </ul> </li> <li>• Inspect, maintain and store fall protection systems.                     <ul style="list-style-type: none"> <li>- Identify damaged or defective fall protection systems including loose or broken handrails or guard rails.</li> <li>- Defective systems should be taken out of service.</li> <li>- Store fall protection systems properly to prevent damage.</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Report and remove defective fall protection systems.</li> <li>• Complete required documentation.                     <ul style="list-style-type: none"> <li>- Report deficiencies to supervisor.</li> </ul> </li> </ul> |
|--|--|



## TASK 7.2

# USE PERSONAL FALL ARREST SYSTEM

### ✓ SUB-TASKS

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. Receive (certified) training for use of fall arrest system.</li> <li>2. Inspect fall arrest system.</li> <li>3. Ensure fall arrest system fits properly.</li> <li>4. Maintain and store fall arrest system.</li> </ol> | <ol style="list-style-type: none"> <li>5. Use fall arrest system as per applicable legislation and site policies and procedures.</li> <li>6. Have and understand rescue plan.</li> </ol> |
|--|--|

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Ensure fall arrest system fits properly.                     <ul style="list-style-type: none"> <li>- Select proper size, position on body, use of trauma straps and adjust correctly.</li> <li>- Follow manufacturer's specifications for use.</li> </ul> </li> <li>• Use fall arrest system as per applicable legislation and site policies and procedures.                     <ul style="list-style-type: none"> <li>- Working from heights (scaffold, scissor lift), open holes.</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Have and understand rescue plan.                     <ul style="list-style-type: none"> <li>- Properly retrieve fallen worker.</li> <li>- Time limitations.</li> </ul> </li> </ul> |
|---|---|

## **TASK 7.3** **USE PORTABLE LADDERS**

### **SUB-TASKS**

1. Identify types, materials sizes and grades of ladders.
2. Check condition of ladder.
3. Erect ladder.
4. Ascend and descend ladder.
5. Perform tasks on ladder.
6. Inspect, clean and store ladder.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Identify types, materials, sizes and grades of ladders.
  - Extension ladders, step ladders.
  - Made of different materials: metal, fiberglass, wood.
  - Different grades of ladders: Grade III, Grade II, Grade I, Industrial.
  - Select ladder appropriate for task and conditions.
- Check condition of ladder.
  - Inspect ladder for faulty rungs or rails before, during and upon completion of job.
  - Tag out and remove ladder, if needed.
- Erect ladder.
  - Place feet of ladder on level surface.
  - Physically secure ladder.
  - Ensure proper angle of repose as per site policies and procedures.
- Ascend and descend ladder.
  - Climb facing ladder.
  - Use three-point contact.
  - Wear fall arrest system, as required.
  - Use assisted stabilization where required.
- Perform tasks on ladder.
  - Follow site specific ladder policy.
  - Work facing ladder and maintain contact with hand, whenever possible.
  - Maintain required distance from top of ladder.
  - Transport materials in suitable container using a rope.
  - Reposition ladder to prevent overreaching.
- Inspect, clean and store ladder.
  - Record and report defect/damage to supervisor.

## **TASK 7.4** **WORK ON SCAFFOLDS AND RAISED PLATFORMS**

### **SUB-TASKS**

1. Ascend and descend scaffold or raised platform.
2. Verify and identify tag.
3. Perform work on scaffold or raised platform.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Ascend and descend scaffold or raised platform.
  - Ensure scaffold has been signed off by certified assembler and is current.
  - Ensure necessary guards are in place.
  - Use three-point contact.
  - Wear fall arrest system, as required.
- Perform work on scaffold.
  - Record and report defect/damage to supervisor.
  - Shut down raised platform if defective.
  - Fasten fall arrest system to appropriate anchorage point at or above shoulder.
- Raised platforms include scissor lifts and aerial boom lifts.
  - Limited to working from raised platform and does not include operation of the equipment.

# DRILLER

## Area of Competency 8: Communicate

## **TASK 8.1** **LISTEN ACTIVELY**

### ✓ **SUB-TASKS**

1. Pay attention to person giving the message.
2. Ask person to repeat information if not understood completely.
3. Confirm information by repeating or rephrasing.

### ✓ **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Pay attention to person giving the message.
  - Reduce surrounding noises by stopping equipment and tools or moving away from noise.
  - Allow speaker to finish message before responding.

## **TASK 8.2** **SPEAK CLEARLY AND CONCISELY**

### ✓ **SUB-TASKS**

1. Give clear and concise directions.
2. Use common language and terminology of work site.
3. Confirm understanding.

### ✓ **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Give clear and concise directions.
  - Organize your thoughts before speaking.
  - Use appropriate volume and tone of voice.
  - Use appropriate body language.
  - Use sketches as required to assist in understanding.
- Confirm understanding.
  - Ask open-ended questions to make sure directions were understood.

## **TASK 8.3** **USE COMMUNICATION DEVICES**

### ✓ **SUB-TASKS**

1. Familiarize self with equipment.
2. Know how to use equipment.
3. Conduct pre-operational check.
4. Use proper communication etiquette.

### ✓ **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Familiarize self with equipment.
  - Includes: two-way radios, telephones, bells, pager phones, public address systems, CB radios, dispatch system (e.g., Modular, WENCO).
  - Use only authorized communication systems.
- Conduct pre-operational check.
  - For two-way radios and pager phones (prepare radio, ensure battery is fully charged, test radio).
  - Use proper communication etiquette.
- Use appropriate radio channels, language and codes.
  - Avoid unnecessary chatter.
  - Maintain radio silence as appropriate.
  - Reduce background noise, such as satellite radio.
  - Follow control room protocol.



## **TASK 8.4** **CONVEY MESSAGE USING SIGNALS**

### **SUB-TASKS**

1. Ensure visual contact.
2. Use and understand appropriate signals for the task.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Ensure visual contact.
  - Take signals from one person only.
  - Confirm signals.
- Use appropriate signals for the job.
  - Includes visual and audible (e.g., hand signals, light signals, horns, bells and whistles).
  - Includes signals for: lifting devices (cranes, cage, skip), tramming, conveyance, aircraft and helicopters.

## **TASK 8.5** **USE WORKPLACE TECHNOLOGIES**

### **SUB-TASKS**

1. Use digital-based training modules.
2. Read and understand machine parameters.
3. Receive and follow dispatch instructions.
4. Use digital input services.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Use digital-based training modules.
  - Interactive digital program, simulators.
  - Enter and track training data.
- Read and understand machine parameters.
  - Electronic warning cluster, warning lights and audible alarms, computer screens.
  - Includes heavy equipment status monitoring screens, in-plant diagrams, on-line references (SDS, SOPs).
- Receive and follow dispatch instructions.
  - Dispatch screen (e.g., Modular, WENCO, Mine Star).
- Use digital input services.
  - Electronic forms, databases, Internet, e-mail.
  - Control and maintenance of Standard Operating Targets and Standard Operating Procedures.

## **TASK 8.6** **COMPLETE WORKPLACE DOCUMENTATION**

### **SUB-TASKS**

1. Use appropriate form.
2. Write legibly.
3. Be specific.
4. Use correct terminology.
5. Submit or file immediately, as required.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Use appropriate form.
  - Includes inspection checklists, logbooks, cross shift notes, shift reports, production reports, near miss reports, incident reports, safety system cards, time cards, training status reports.
- Be specific and timely.
  - Include accurate information, appropriate details and complete report in full and submit in a timely manner.



## TASK 8.7

# COACH OR MENTOR OTHER COWORKERS/PEERS

### ✓ SUB-TASKS

1. Demonstrate proper technique.
  2. Check for understanding.
  3. Observe coworkers/peers.
  4. Provide assistance and appropriate feedback.
  5. Continue to observe/follow up.
  6. Report to supervisors, if applicable.
- 

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- No additional references or examples.

# DRILLER

## Area of Competency 9: Be Professional

## **TASK 9.1** **WORK IN A TEAM ENVIRONMENT**

### **SUB-TASKS**

1. Respect team members.
2. Be professional.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Respect team members.
  - Accommodate each other's communication needs (language differences).
  - Cooperate with each other (need to be able to trust one another and rely upon each other).
  - Be tolerant of others.
  - Be willing to learn from others; be willing to mentor others.
- Be professional.
  - Understand requirements for the job.
  - Show up to work on time.
  - Demonstrate a strong work ethic.
  - Understand chain of command.
  - Follow, model and promote safety and legislative requirements.

## **TASK 9.2** **WORK IN A CULTURALLY DIVERSE ENVIRONMENT**

### **SUB-TASKS**

1. Respect practices of co-workers and local populations.
2. Respect social and cultural differences.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Respect practices of co-workers and local populations.
  - Be open-minded.
- Respect social differences.
  - Show interest in others (ask about work experience, family).
  - Be a role model for others.

## **TASK 9.3** **MAINTAIN GOOD COMMUNITY RELATIONS**

### **SUB-TASKS**

1. Consider yourself an ambassador for the industry and the company.
2. Support local businesses and events.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Consider yourself an ambassador for the industry and the company.
  - Recognize that personal behavior both in person and online affects public perception of employer.
- Support local businesses.
  - Buy supplies locally.



## TASK 9.4

# DEMONSTRATE HIGH STANDARDS OF CONDUCT

### ✓ SUB-TASKS

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Model safety leadership.</li> <li>2. Be both consistent and fair.</li> </ol> | <ol style="list-style-type: none"> <li>3. Maintain integrity.</li> <li>4. Protect company proprietary.</li> </ol> |
|--|---|

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Model safety and environmental leadership.                     <ul style="list-style-type: none"> <li>- Lead by example, “walk the talk”.</li> <li>- Lead toolbox/safety huddle and safety meetings.</li> <li>- Ensure safety of crew (fit for work, proper PPE).</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Maintain integrity.                     <ul style="list-style-type: none"> <li>- Ensure strong moral principles both online and in person.</li> </ul> </li> <li>• Protect company proprietary.                     <ul style="list-style-type: none"> <li>- Knowledge and understanding of company proprietary process.</li> </ul> </li> </ul> |
|---|---|

# DRILLER

## Area of Competency 10: Equipment Knowledge



## TASK 10.1

# DEMONSTRATE EQUIPMENT KNOWLEDGE

### ✓ SUB-TASKS

1. Trained, qualified and authorized for proper use and operation of equipment.
2. Conduct pre-operational checks.
3. Properly mount and dismount equipment.
4. Start equipment.
5. Conduct operational checks.
6. Drive equipment to worksite, as required.
7. Shut down equipment (normal and emergency situations).
8. Conduct post-operational check.
9. Knowledge of refueling procedure.
10. Toggle controls to release stored energy.
11. Use appropriate ventilation supplies for operating.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Trained and authorized for proper use and operation of equipment.
  - Follow manufacturer's recommendations and specifications.
  - Follow safe operating procedures.
  - Know capabilities and limitations of equipment.
- Conduct pre-operational checks.
  - Inspect equipment for defects, hazards and potential hazards.
  - Identify and assess severity of equipment defects.
  - Take corrective action to restore normal equipment operation.
  - Record defect(s) and corrective action taken in logbook.
  - Damage to equipment.
  - Steering.
  - Test brakes, as per manufacturer's specifications.
  - Tires and undercarriage pre op check.
  - Know and understand fire suppression systems.
  - Bolts, keepers and holders.
  - Oil spills and/or excessive grease.
  - Pinion and ball gears.
  - Rope windows.
- Inspect layout of hoist.
  - Conveyance inspections.
  - Test all forms of communication – radio, bell phones, pager phones.
  - Mechanical, electrical and HMI (Human-Machine Interface).
- Properly mount and dismount equipment.
- Ensure equipment is shut down before exiting.
  - Use three-point contact.
  - Use grab handles and handrails.
- Start equipment.
  - Neutralize controls (transmission, control levers).
  - Activate power supply (master switch).
  - Use warning signal before start-up.
  - Activate ignition.
- Conduct operational checks.
  - Read and countersign logbook.
  - Fill out pre-operational check sheet.
  - Check gauges, consoles and alert indicators.
  - Ensure air and oil are at required levels.
  - Listen for unusual noises (engine, power train).
  - Check brakes and steering are functional.
  - Check warning systems and lights are operating.
- Hoist testing (trial run, brake tests, conveyance checks, cage and skip checks).
  - Test hoist limits of travel – over wind, under wind, track limit.
- Drive equipment to worksite, as required.
  - Wear seat belts.
  - Use appropriate warning lights and signals.
  - Test service and emergency brakes.
  - Follow designated travel routes.
  - Observe speed limit, traffic signs, traffic patterns and rights-of-way.
  - Adjust speed according to road and weather conditions.
  - Listen for unusual noises (engine, power train).
- Operate equipment.
  - Wear seatbelts.
  - Use appropriate warning lights and signals.
  - Test service and emergency brakes.
  - Follow designate travel routes.
  - Observe speed limit, traffic signs, traffic patterns and rights-of-way.
  - Operate machine controls smoothly.
  - Adjust speed according to road and weather conditions.
  - Listen for unusual noises (engine, power train).
  - To maximize efficiency and ensure safety of other personnel and equipment.
  - Assess material and site conditions to determine appropriate operating techniques and speeds.
  - Monitor ammeter.
- Shut down equipment (normal situations)
  - Park in designated areas.
  - Set parking/emergency brake.
  - Ground all equipment implements.
  - Shut off ignition and/or fuel supply.
  - Toggle controls to release stored energy.
  - Shut off master switch.
  - Set wheel chocks.
  - Lock out and tag as required.
- Shut down equipment (emergency situations).
  - Recognize and respond to alarms.
  - Shut down as prescribed for type of hazard.
  - Set off fire suppression system, as required.
  - Report incident to appropriate personnel.
- Conduct post-operational check.
  - Fill out logbook.

## **TASK 10.2** **WORKING WITH MOBILE EQUIPMENT**

### **SUB-TASKS**

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Use appropriate personal protective equipment.</li> <li>2. Be cautious around moving parts of equipment.</li> <li>3. Identify potential pedestrian, traffic interaction, subsurface and overhead utilities.</li> </ol> | <ol style="list-style-type: none"> <li>4. Avoid hazardous conditions.</li> <li>5. Demonstrate knowledge of working in vicinity of explosives.</li> <li>6. Demonstrate knowledge of working in close quarters and around equipment.</li> </ol> |
|--|---|

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Be cautious around moving parts of equipment.                             <ul style="list-style-type: none"> <li>- Avoid pinch points.</li> <li>- Ensure appropriate guards are in place.</li> <li>- Stay clear of moving pulleys and belts.</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Avoid hazardous conditions.                             <ul style="list-style-type: none"> <li>- Identify blind spots.</li> <li>- Use designated travel ways.</li> <li>- Check for power, telephone and cable lines, guy wires and fences, low clearance areas and stationary equipment.</li> <li>- Call before you dig.</li> <li>- Avoid debris resulting from work or movement of equipment.</li> </ul> </li> </ul> |
|--|--|

## **TASK 10.3** **WORK WITH STATIONARY EQUIPMENT**

### **SUB-TASKS**

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Use appropriate personal protective equipment.</li> <li>2. Avoid hazardous conditions.</li> </ol> | <ol style="list-style-type: none"> <li>3. Demonstrate knowledge of working in close quarters and around equipment.</li> </ol> |
|---|---|

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Be cautious around moving parts of equipment.                             <ul style="list-style-type: none"> <li>- Avoid pinch points.</li> <li>- Ensure appropriate guards are in place.</li> <li>- Stay clear of moving pulleys and belts.</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Avoid hazardous conditions.                             <ul style="list-style-type: none"> <li>- Identify blind spots.</li> <li>- Use designated travel ways.</li> <li>- Avoid debris resulting from work or equipment.</li> </ul> </li> </ul> |
|--|---|



# DRILLER

## Area of Competency 11: Protect the Environment



## TASK 11.1

# COMPLY WITH ENVIRONMENTAL POLICIES, PROCEDURES AND PERMITS

### ✓ SUB-TASKS

1. Minimize environmental impact of operations.
2. Follow appropriate handling and clean-up procedures for various substances.
3. Comply with environmental policies.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Minimize environmental impact of operations.
  - Minimize waste produced (use recommended quantities of additives, do not let equipment run/idle unnecessarily, recycle fluid returns).
  - Use biodegradable and non-toxic additives and store and handle with caution to prevent loss.
  - Use appropriate waste disposal measures.
  - Be aware of restrictions for emissions and noise.
  - Avoid practices that may cause erosion, soft ground rutting.
  - Follow existing roads when possible.
  - When constructing new access routes avoid sensitive areas (swamps, rivers, streams, lakes), avoid cutting, pushing or dumping debris into water courses, use proper bridging techniques, avoid recreational and historical/cultural/archaeological sites, plantations, fish, wildlife and their habitats and whenever possible, minimize tree cutting.
- When setting up work site avoid unnecessary stripping or grubbing of vegetation, neatly stockpile disturbed overburden for reclamation purposes, maintain required distance from water bodies and courses, ensure campsite construction conforms to regulations and safety practices (structure spacing, noise abatement, fire control).
- Follow appropriate handling and clean-up procedures for various substances.
  - Identify environmental issues.
  - Assess severity of environmental issue.
  - Take corrective action.
  - Report environmental issue and corrective action to appropriate personnel.
  - Record environmental issue and corrective action in logbook.



## TASK 11.2

# APPLY SPILL CONTAINMENT MEASURES

### ✓ SUB-TASKS

1. Identify when containment is required.
2. Know and select appropriate type of containment.
3. Install containment, as per company policies.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Identify when containment is required.
  - Containment is required for the storage and handling of fuel, cuttings, hazardous materials, liquid and solid wastes.
- Select appropriate type of containment.
  - Types of containment include straw, berms, pits, portable plastic containers, ditches, silt fencing, secondary containers of required dimensions.
  - Match type of containment to the area and material being contained.
- Install containment.
  - Install containment best suited to material being contained (fuel drum inside another secondary container, fuel tank inside a berm, double-walled fuel tanks).

## TASK 11.3 MANAGE WASTE

### ✓ SUB-TASKS

1. Select and use appropriate PPE.
2. Identify type of waste.
3. Manage solid waste.
4. Manage liquid waste.
5. Manage recycling waste.
6. Manage biohazard waste.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Select and use appropriate PPE.
- Identify type of waste.
  - Identify generated waste including solid, liquid and recycling.
  - Identify the need to set up waste management measures.
  - Select appropriate type of waste management measures.
  - Follow waste management policies and procedures.
  - Adhere to applicable environmental legislation and regulations.
- Manage solid waste, as per company policies and regulations.
  - Use sumps to remove excess water from solids (ensure sumps are of adequate size and capacity; direct water to designated areas with good drainage where natural percolation can occur without reappearance).
- Manage liquid waste, company policies and regulations.
  - Includes sludge, cuttings, waste oil.
  - Select compatible disposal equipment.
  - Document and follow instructions for disposal of all effluent.
  - Collect used petroleum products (transfer used oil into clean pails/containers marked “waste oil” and dispose of as required).
  - Use special precautions when working adjacent to lakes, rivers or creeks (do not direct excess fluid into any watercourse unless treated and approved by regulatory authorities).
- Manage recycling waste, company policies and regulations.
  - Cardboard, scrap metal, empty fuel drums, empty propane tanks and unused lumber must be salvaged and recycled.
- Manage biohazard waste, company policies and regulations.
  - Comply with WHMIS, if applicable.

## TASK 11.4 MANAGE FUELS AND OTHER HAZARDOUS MATERIALS

### ✓ SUB-TASKS

1. Identify types of fuels and other hazardous materials.
2. Transfer fuels and other hazardous materials.
3. Use spill prevention measures.
4. Store fuels and other hazardous materials.
5. Transport fuel/propane and other hazardous materials.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Identify types of fuels and other hazardous materials.
  - Types of fuels include gasoline, propane, diesel.
  - Types of hazardous materials include mill reagents (e.g., cyanide, collectors, frothers), oil, hydraulic fluid, antifreeze, battery acid, grease, solvents, fuel additives.
- Transfer fuels and other hazardous materials.
  - Use closed systems.
  - Drain transfer hoses.
  - Ensure emergency equipment is available and accessible (fire extinguisher, spill kits).
  - Do not leave fuel, equipment or fuel pump nozzles unattended while refueling.
- Use spill prevention measures.
  - Includes oil absorbent matting, drip trays.
  - Replace caps and nozzles on fuel cans immediately after use.
- Store fuels and other hazardous materials.
  - Fill fuel tank to safe level; do not overfill.
  - Identify and repair leaks immediately.
  - Ensure all equipment used for storage of fuels and other hazardous materials are in good condition and/or properly installed.
  - Store cylinders and other fuel containers in an upright position in approved storage area.
  - Ensure proper labelling of containers and signage.
- Transport fuel/propane and other hazardous materials.
  - Obtain certification for to transport dangerous goods (TDG) and WHMIS.
  - Ensure proper permits are in place.
  - Check bills of lading against supplies.
  - Use appropriate types and sizes of containers to transport hazardous materials.



## TASK 11.5 RESPOND TO SPILLS

### ✓ SUB-TASKS

1. Assess danger.
2. Manage spill.
3. Complete follow-up spill reporting procedures.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Assess danger.
  - Halt operations.
  - Identify substance.
  - Determine risk to self and others.
  - Take precautions if substance is highly volatile.
- Manage spill.
  - Take action to stop a continuous spill (turn off pump, reposition overturned containers).
  - Determine spill spread (into ground, run off into watercourse).
  - Initiate spill containment (initiate company contingency plan for specific situation, isolate and remove spill material and contaminated material under and around spilled material if possible).
  - Monitor safe, uncontained spill until relieved by appropriate personnel.
  - Complete follow-up spill reporting procedures.
- Notify supervisor.
  - Notify proper authorities (Spill Line).
  - Complete required documentation (Spill Report form).

# DRILLER

## Area of Competency 12: Operate Support Equipment

**THE FOLLOWING PRINCIPLES APPLY TO ALL TASKS UNDER THIS AREA OF COMPETENCY**

- ✓ Adhere to Area of Competency 10 – Equipment Knowledge
- ✓ Adhere to Task 3.4 - Recognize and comply with traffic management plans
- ✓ Adhere to Task 8.4 - Convey message using signals
- ✓ Adhere to operating manuals and manufacturers’ specifications/recommendations

**TASK 12.1  
OPERATE LIGHT OR SERVICE VEHICLE**

**✓ SUB-TASKS**

1. Demonstrate equipment knowledge.
2. Ensure proper housekeeping of vehicle.
3. Load, transport and unload materials, supplies and/or personnel.

**✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Ensure proper housekeeping of vehicle.
  - Keep vehicle free from clutter.
  - Ensure vehicle is equipped with appropriate equipment including but not limited to; first aid kit, survival kit, spill kit, fire extinguisher, wheel chalk.
- Load, transport and unload materials, supplies and/or personnel.
  - Ensure protection of self and others.
  - Ensure non-movement of vehicle while loading.
  - Observe load limitations.
  - Secure seats, safety bars and chains.
  - Follow procedures when: towing trailers/carriers to transport materials (capacity, transporting materials on board, positioning and fastening).
  - Secure loads.

**TASK 12.2  
OPERATE UTILITY VEHICLES**

**✓ SUB-TASKS**

1. Demonstrate equipment knowledge.
2. Move equipment and materials.
3. Transport personnel.

**✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Demonstrate equipment knowledge.
  - Check for emergency equipment (ABC fire extinguisher, first aid kit, vehicle permit, tool kit).
  - Boom truck.
  - Ensure fire suppression equipment, if required.
- Move equipment and materials.
  - Do not overdrive headlight while driving.
  - Follow load limitations.
  - Take precautions at ramps, corners and intersections.
  - Follow procedures when towing trailers/carriers to transport materials (capacity, transporting materials on board, positioning and fastening).
  - Follow explosive management plan.
- Transport personnel.
- Ensure protection of self and others.

## **TASK 12.3** **OPERATE FUEL OR LUBE TRUCK**

### **SUB-TASKS**

1. Demonstrate equipment knowledge.
2. Transfer fuel and lube to equipment.
3. Load fuel or lube truck.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Demonstrate equipment knowledge.
  - Ensure no smoking or open flame in and/or around vehicle.
  - Visually inspect chassis and attachments to verify integrity of tank.
  - Confirm presence of warning placards for dangerous goods.
  - Observe load limitations.
- Transfer fuel and lube to equipment.
  - Approach equipment with operator in full view.
  - Ensure equipment has been stopped/parked and attachments grounded.
  - Ensure non-movement of vehicle while transferring.
  - Ensure proper hook-up of equipment.

## **TASK 12.8** **OPERATE SKIDDER**

### **SUB-TASKS**

1. Demonstrate equipment knowledge.
2. Move equipment and material.
3. Operate winch.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Demonstrate equipment knowledge.
  - Carry load appropriate to the size of machine.
- Move equipment and material.
  - Use basket to carry materials.
  - Secure materials in basket appropriately.
  - Travel with blade raised to avoid obstacles, but not blocking visibility.
  - Operate only when both brake systems are working.

## **TASK 12.9** **OPERATE WINCH**

### **SUB-TASKS**

1. Demonstrate equipment knowledge.
2. Move load.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Demonstrate equipment knowledge.
  - Consists of stationary turning drum wrapped with chain, cable or rope which is attached to the load being moved.
  - Keep cable rolled on winch when not hauling a load.
  - Ensure winch, cable, chains or rope and sling can handle load, check rating if available.
  - Use proper size and type of cable.
  - Check condition of winch roller, hooks, shackles, cable clamps.
  - Check condition of cable, chains or rope (cable free of frays and burns, hook not twisted, hook free of cracks, chain links are not broken and free of kinks).
  - Check alignment of cable, chains or rope on drum.
  - Do not handle cable while it is reeling back on to the drum/spool.
  - Keep a safe distance away from cable, chain or rope that has a load in tow.
- Move load.
  - Ensure load is properly aligned with hoisting equipment before winching.
  - Winch in as straight a line as possible.
  - Control play-out of cable (keep several cable wraps on drum).
  - Move load to desired location and disconnect from cable, chains or rope.
  - Rewind cable, chains or rope onto winch drum.

## **TASK 12.12** **OPERATE SUPPORT LOADER**

### **SUB-TASKS**

1. Demonstrate equipment knowledge.
2. Select and utilize appropriate implement for selected task.
3. Change implements as needed.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Select and utilize appropriate implement for selected task.
  - Rock bucket, clean up bucket, forks, grapple, rock breaker.
- Change implements as needed.
  - Follow appropriate procedures.



## **TASK 12.20** **OPERATE ALL-TERRAIN VEHICLES**

### **SUB-TASKS**

1. Demonstrate equipment knowledge.
2. Move equipment, materials and personnel.
3. Transport all-terrain vehicle.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Demonstrate equipment knowledge.
  - Identify hazardous or potentially hazardous conditions (during spring and fall conditions, avoid and not create avoid heavily rutted trails/road, on hills, watch for tip-over risks, on blind hills and curves, water flows, extreme weather conditions, unsuitable ground/ice conditions, ground conditions of access to and from location).
  - Ensure use of proper PPE and seatbelts.
  - Do not overdrive headlight.
- Move equipment and materials.
  - Ensure vehicle permit, proof of insurance and valid driver's license are all with the vehicle, when applicable.
  - Inform responsible person of travel plan (departure and estimated return time and route).
- Transport all-terrain vehicle.
  - Follow procedures when loading and unloading onto trailer or pick-up truck.
  - Follow procedures when towing trailers/carriers to transport materials (capacity, transporting materials on board, positioning and fastening).

## **TASK 12.21** **OPERATE SNOWMOBILES**

### **SUB-TASKS**

1. Demonstrate equipment knowledge.
2. Move equipment, materials and personnel.
3. Transport snowmobile.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Demonstrate equipment knowledge.
  - Use helmets and seatbelts.
  - Identify hazardous or potentially hazardous conditions: fences and guy wires, ice thickness on frozen lakes, rivers, streams, overhead branches, roads and vehicle traffic.
  - Do not overdrive headlight.
- Move equipment, material and personnel.
  - Ensure vehicle permit, proof of insurance and valid drivers' license are with the vehicle.
  - Pack tool kits and emergency kit (spark plugs, belt, flares, sounding device, first aid kit).
  - Avoid travelling on roads.
  - Inform responsible person of travel plan (departure and estimated return time and route).
  - Travel in pairs, based on company policies and procedures.
- Transport snowmobile.
  - Follow procedures when loading and unloading onto trailer or pick-up truck.

## **TASK 12.22** **OPERATE WATERCRAFT**

### **SUB-TASKS**

1. Demonstrate equipment knowledge.
2. Load and unload.
3. Move equipment, materials and personnel.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Demonstrate equipment knowledge.
  - Identify hazardous or potentially hazardous conditions including waterway hazards (dead heads, sand bars, shallow channels), tripping hazards (ropes and containers), improperly marked fuel containers, sudden changes in weather and/or marine conditions.
  - Identify safety devices on watercraft (paddles, life jackets).
- Load and unload.
  - Ensure dock has capacity for watercraft (size, depth of water).
  - Position watercraft in designated/approved area (dock).
  - Comply with load limits.
  - Distribute load evenly to prevent tipping.
  - Secure loads and materials.
- Move equipment and personnel.
  - Ensure vehicle permit, proof of insurance and valid operator's license are with the watercraft, when required.
  - Ensure all personnel are wearing lifejackets/personal floatation devices.
  - Follow a designated route.

## **TASK 12.24** **OPERATE PUMPS**

### **SUB-TASKS**

1. Demonstrate equipment knowledge.
2. Install pump.
3. Monitor pump operation.
4. Switch pumps.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Demonstrate equipment knowledge.
  - Includes piston pumps, plunger pumps (grout pump), centrifugal pumps (trash or volume pump), screw pump (Moyno pump), diaphragm pump.
  - May be powered by internal combustion, diesel, hydraulic, air or electric motors.
- Install pump.
  - Identify components required (pumps, water heaters, suction/discharge hoses, pressure relief valve, signor valves, check valves).
  - Place equipment at predetermined location(s).
  - Lock out, tag out (LOTO).
  - Secure pump and discharge lines.
  - Screen intake.
  - Verify discharge.
- Monitor pump operation.
  - Control volume, temperature, pressure, minimal vibration, direction of flow from discharge lines.
  - Ensure no excessive leaking of gland water.
  - Perform routine checks.
  - Troubleshoot pumping system.
  - Clear blockages.
  - Identify flow/head requirements and materials (i.e., slurry, reagent).
  - De-energize lines.
- Switch pumps.
  - Switch to stand-by pump.
  - Open and close valves slowly and accurately.
  - Do not over tighten.

## **TASK 12.25** **OPERATE MIXERS**

### **SUB-TASKS**

1. Demonstrate equipment knowledge.
2. Knowledge of plugged lines.
3. Conduct operational procedures.
4. Ensure proper maintenance to unit.
5. Proper storage of unit.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Demonstrate equipment knowledge.
  - Set up mixer ensuring it is secure and on a flat level base.
  - Includes prop, arbour, submergible, venture, colloidal, paddle.
- Conduct operational checks.
  - Check for vibrations.
  - Monitor to ensure that all fittings are tight while in use and in storage.
  - Ensure proper guarding is in place.

## **TASK 12.26** **OPERATE FLUID RECYCLING SYSTEMS**

### **SUB-TASKS**

1. Demonstrate equipment knowledge.
2. Conduct operational checks.
3. Perform routine maintenance.
4. Handle cuttings.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Demonstrate equipment knowledge.
  - Includes filter type, centrifuge, settling, cyclone, shaker.
- Conduct operational checks.
  - Check for vibration.
  - Monitor for effectiveness.

# DRILLER

## Area of Competency 13: Operate Heavy Equipment

**THE FOLLOWING PRINCIPLES APPLY TO ALL TASKS UNDER THIS AREA OF COMPETENCY**

- ✓ Adhere to Area of Competency 10 – Equipment Knowledge
- ✓ Adhere to Task 3.4 - Recognize and comply with traffic management plans
- ✓ Adhere to Task 8.4 - Convey message using signals
- ✓ Adhere to operating manuals and manufacturers’ specifications/recommendations

**TASK 13.2**  
**OPERATE UNDERGROUND LOCOMOTIVES**

**SUB-TASKS**

- |                                     |                         |
|-------------------------------------|-------------------------|
| 1. Demonstrate equipment knowledge. | 3. Starting locomotive. |
| 2. Move equipment and material.     | 4. Braking.             |

**REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Demonstrate equipment knowledge.                     <ul style="list-style-type: none"> <li>- Types include diesel, battery operated, trolley.</li> <li>- Do not carry loose objects, operate with loose clothing or unlaced footwear.</li> </ul> </li> <li>• Move equipment and material.                     <ul style="list-style-type: none"> <li>- Transport materials on appropriate type of car, e.g., flat car.</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Starting locomotive.                     <ul style="list-style-type: none"> <li>- Ensure proper air pressure.</li> </ul> </li> <li>• Braking                     <ul style="list-style-type: none"> <li>- Know and use proper hand and dynamic braking techniques.</li> </ul> </li> </ul> |
|---|--|

**TASK 13.7**  
**OPERATE TRACK DOZER**

**SUB-TASKS**

- |                                     |                                       |
|-------------------------------------|---------------------------------------|
| 1. Demonstrate equipment knowledge. | 5. Dump management.                   |
| 2. Transport/relocate dozer.        | 6. Live pile management.              |
| 3. Push and/or rip materials.       | 7. Road construction and maintenance. |
| 4. Conduct loading unit clean-up.   |                                       |

**REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Demonstrate equipment knowledge.                     <ul style="list-style-type: none"> <li>- Travel up grade and down grade in an efficient manner.</li> <li>- Select correct gear and vehicle speed.</li> <li>- Position vehicle and ensure correct blade and/or attachment.</li> <li>- Observe signals and procedures (forward and backward movement).</li> <li>- Lower attachments to ground.</li> </ul> </li> <li>• Transport/relocate dozer.                     <ul style="list-style-type: none"> <li>- Via lowboy, haul truck or walking according to site specifications.</li> </ul> </li> <li>• Push and/or rip materials.                     <ul style="list-style-type: none"> <li>- Load blade, carry material, dump material.</li> <li>- Follow proper ripping techniques according to material type.</li> </ul> </li> <li>• Conduct loading unit clean-up.                     <ul style="list-style-type: none"> <li>- Shovels, excavators, loaders, etc.</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Dump management.                     <ul style="list-style-type: none"> <li>- Grade control.</li> <li>- Dump height and limit control.</li> <li>- Maintain berm height according to code.</li> <li>- Manage haul truck traffic, if required.</li> </ul> </li> <li>• Live pile management.                     <ul style="list-style-type: none"> <li>- Follow lock out procedure.</li> <li>- Develop and communicate plan to applicable parties.</li> </ul> </li> <li>• Road construction and maintenance.                     <ul style="list-style-type: none"> <li>- Construction of primary and/or secondary road.</li> <li>- Construction of a ramp.</li> <li>- Perform tasks according to engineered plans.</li> <li>- Fill and repair roads according to site policies and procedures.</li> </ul> </li> </ul> |
|---|---|

## **TASK 13.9** **OPERATE PRODUCTION LOADER**

### **SUB-TASKS**

1. Demonstrate equipment knowledge.
2. Loading.
3. Travelling/tramming.
4. Transport equipment and/or supplies.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Demonstrate equipment knowledge.
  - Raising and lowering bucket.
  - Push plate.
  - Tilting and tipping bucket.
  - Selecting correct gear for given operation.
  - Lower attachments to ground.
- Loading.
  - Knowledge of material to be loaded.
  - Use proper techniques to load material for transport.
- Travelling/tramming.
  - Ensure bucket is in safe transporting condition.
  - Maintain floor and carry load at appropriate height.
- Deliver equipment and/or supplies.
  - Ensure proper roadway conditions.
  - E.g., ground support, power supplies, service, pipes, electrical.

# DRILLER

## Area of Competency 14: Use Hand and Power Tools



## TASK 14.1

# DEMONSTRATE HAND AND POWER TOOL KNOWLEDGE

### ✓ SUB-TASKS

1. Select appropriate PPE.
2. Trained in proper use and application of hand and power tools.
3. Inspect tool for defects/damages.
4. Maintain tools.
5. Store tools.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Train in proper use and application of hand and power tools.
  - Includes wrenches (socket, adjustable, pipe, box-end, etc.), impact tools, electric tools, chainsaws, handsaws, hammers, screwdrivers, hose repair equipment, shovel.
  - Identify capabilities and limitations of tool.
  - Select appropriate type, size, shape and capacity of hand tools for type of task to be completed, type of material to be used, necessary force to be applied, most efficient usage.
  - Tether tools when working at heights.
  - Assemble and adjust hand tools according to manufacturer's recommendations.
  - Follow procedures for start-up, operation, shutdown, disconnect and use/replacement of attachments.
  - Position tool properly.
  - Use safety features.
- Inspect tool for defects.
  - Identify any defective, broken or damaged tools and attachments.
  - Assess severity of defect/damage.
  - Do not use defective tools.
  - Do not remove or modify safety devices.
  - Remove and/or lock out and tag any defective tools and attachments.
  - Report defect/damage to appropriate personnel.
- Maintain tools.
  - Clean and inspect tool before returning to storage.
  - Ensure tool is unplugged when replacing worn or dull drill bits, saw blades.
  - Ensure battery maintenance.
- Store tools.
  - Store in appropriate designated place.



## TASK 14.2

# USE POWER, CORDLESS, PNEUMATIC, POWDER-ACTUATED AND HYDRAULIC POWERED TOOLS

### ✓ SUB-TASKS

1. Demonstrate tool knowledge.
2. Select appropriate tool.
3. Select appropriate PPE.
4. Use tool.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Demonstrate tool knowledge.
  - Ensure trained in proper use and application of tool.
  - Use proper extension cords, pneumatic hoses and secure them in safe location.
  - Safety practices when using hydraulic.
  - Inspect extension cords before using.
  - Inspect batteries and battery chargers.
  - Use ground fault protector including draining air and waterlines before disconnecting.
  - Ensure proper PPE.
- Place hoses and lubricators properly to avoid tripping and other hazards.
- Connect tools to air lines following procedures.
- Follow proper pneumatic or hydraulic tool shut-down procedures.
- Ensure batteries are replaced on the chargers.
- Select appropriate tool.
  - Includes air grinder, air lights, generators, chainsaws, hydraulic tools (jacks, air tugger, winch).
  - Clean tools according to manufacturer's instructions.



## **TASK 14.3** **OPERATE GROUTING EQUIPMENT**

### **SUB-TASKS**

1. Demonstrate equipment knowledge.
2. Select and inspect grouting equipment.
3. Use specialized PPE, as required.
4. Perform grouting.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Select grouting equipment.
  - Includes pump, pressure rated hoses, plugs, grout type, additives.
  - Knowledge of emergency response procedures.
- Perform grouting.
  - Prepare grout mixture, including cement, chemicals, water, additives.
  - Mix to prescribed ratios.
  - Install grout plugs when required.
  - Pump grout mixture into the hole as specified.
  - Flush grouting system.

## **TASK 14.4** **OPERATE CHAINSAWS**

### **SUB-TASKS**

1. Demonstrate tool knowledge.
2. Use specialized PPE, as required.
3. Operate chainsaw.
4. Conduct post-op inspection and proper storage.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Demonstrate hand and power tool knowledge.
  - Understand and select appropriate chainsaw (e.g., air, electric, battery).
  - Timbers.
- Wear proper specialized PPE.
  - Including but not limited to: chaps, face shield, gloves.
- Cut, back-cut, fall, de-limb trees.
  - Watch for dangerous trees or limbs (“widow-makers”), if applicable.
  - Cut timber to size.



## TASK 14.6

# OPERATE MOBILE GENERATORS

### ✓ SUB-TASKS

1. Demonstrate equipment knowledge.
  2. Operate generator under no load conditions.
  3. Operate generator under load conditions.
- 

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Demonstrate hand and power tool knowledge.
  - Use appropriate generator (e.g., diesel, gas, air, battery).
  - Set up equipment, ensuring it is secure and on a flat, level base.
  - Conduct pre-op inspection, if applicable.
  - Follow proper mine ventilation procedures.
  - Ground generator.

# DRILLER

## Area of Competency 15: Working Underground

## **TASK 15.1** **MINE ENTRY MANAGEMENT (TAG IN TAG OUT)**

### **SUB-TASKS**

1. Report to supervisor.
2. Obtain tag and time worksheet.
3. Tag into appropriate workplace location.
4. Tag out at end of shift.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Report to supervisor.
  - To receive work instructions for day.
  - To receive information about workplace conditions.
- Understand emergency procedures.
- Do not move other workers tags.

## **TASK 15.2** **INSPECT VENTILATION**

### **SUB-TASKS**

1. Inspect ventilation.
2. Report deficiencies.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Inspect ventilation.
  - Ensure area is ventilated before entering work area.
  - Use and monitor the appropriate gas detectors.
  - Inspect vent duct for rips and tears.
  - Identify location of doors, barricades and fans.
  - Ensure ventilation system is properly installed.
  - Inspect and maintain sufficient air flow.
  - Identify ventilation flow deficiencies.
  - Take corrective actions as required and according to company standards and government regulations.
- Report deficiencies.
  - Report deficiencies to appropriate personnel.

# DRILLER

## Area of Competency 16: Scale Loose Rock



## TASK 16.1

# RECOGNIZE LOOSE OR ABNORMAL GROUND CONDITIONS

### ✓ SUB-TASKS

1. Determine ground conditions.
2. Determine guarding and reporting procedures.
3. Take corrective actions.
4. Describe methods of ground control monitoring.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Determine ground conditions.
  - Identify geological structures including faults, slips, jointing, contacts, dykes, contacts, fracture system, folding.
  - Visually inspect for signs including deformation of drill holes, cracks, stress, ground movement, condition of ground support system, floor heaving, tracks shifting, fresh muck on floor.
  - Refer to history and communication in logbook/ground control.
  - Listen for rock noises (air blast, snapping or popping).
- Determine guarding and reporting procedures.
  - Isolate area according to company standards.
  - Report condition(s) to appropriate personnel.
- Take corrective actions.
  - Assess danger throughout drilling operation (stop drill and inspect conditions regularly (tap rock and listen to sound)).
  - Wash and scale loose rock.
  - Notify supervisor of situation that requires further investigation.
  - Communicate to local area workers about changing conditions.
- Describe methods of ground control monitoring.
  - Lay out and planning.
  - Specialized blasting.
  - Instrumentation (micro-seismic system, tape extensometers, stress metres).
  - De-stressing.
  - Numerical modeling.



## TASK 16.2

# RECOGNIZE FAULTY GROUND SUPPORT

### ✓ SUB-TASKS

1. Describe ground support systems.
2. Determine when abnormal conditions are present.
3. Take corrective actions.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Describe ground support systems.
  - Includes bolting, timbering, cementing (shotcrete), backfilling, screening, strapping, cable bolting.
- Determine when abnormal conditions are present.
  - Visually inspect for signs including deformed plates, cracked cement, rock-filled and/or broken screens, cracked timber, dry rot, bulging screen, snapping/shredding bolts, corrosion.
  - Make inspection by sounding and listening for rock noise(s).
- Take corrective actions.
  - Scale loose rocks where applicable.
  - Recondition as needed.
  - Communicate to local area workers about changing conditions.
  - Isolate area according to company standards.
  - Notify supervisor of situation that requires further investigation.

## **TASK 16.3** **WASH ROCK SURFACES**

### **SUB-TASKS**

1. Select correct hoses to suit specific application.
2. Demonstrate equipment knowledge.
3. Wash rock back and walls.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Select correct hoses to suit specific application.
  - Choose appropriate dimensions and length of hoses.
- Equipment knowledge
  - Fasten hoses to prevent leaks under static and dynamic working pressure.
  - Position hoses correctly.
  - Ensure hoses are not in contact with any equipment.
- Wash rock back and walls.
  - Ensure proper amount of water has been used.
  - Wash to minimize dust and expose rock fractures.
  - Wash rock according to site policies and procedures.

## **TASK 16.4** **SCALE ROCK**

### **SUB-TASKS**

1. Select scaling bar.
2. Scale loose rock.
3. Maintain scaling bars.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Select scaling bar.
  - Select proper length of bar for specific task.
  - Check condition of bar for wear and tear, straightness, sharpness, rubber hand guard.
  - Use non-sparking tip in gas rich mine (e.g., methane).
  - Do not use worn bar.
- Scale loose rock.
  - Scale from good ground to bad ground.
  - Ensure good footing.
  - Ensure clear space behind for retreat.
  - Ensure scaled material has a safe bed to fall on.
  - Anticipate the size and movement of falling ground and stand clear.
  - Scale from a safe position.
  - Scale within one's physical limits (do not overreach, keep balance, maintain suitable working posture).
- Sound ground for 'drummy' or solid ground conditions.
  - Scale from good ground to bad.
  - Take down all loose ground possible.
  - Continuously scale during task.
  - Watch for unexpected fall from back, face, pillar or wall.
  - Drop bar if control is lost.
  - Ensure other workers are positioned in a safe location.
  - Ensure lighting is adequate.
  - Ensure workplace is scaled at all times.
- Maintain scaling bars.
  - Keep scaling bars clean and sharp.
  - Discard any bent or chipped bars.

# DRILLER

## Area of Competency 17: Perform General Services





## TASK 17.1

# KNOWLEDGE OF INSTALLATION AND MAINTENANCE SYSTEMS AND LINES

### ✓ SUB-TASKS

1. Plan and prepare for installation of lines and systems.
2. Install lines and systems.
3. Conduct housekeeping activities.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Plan and prepare for installation of lines and systems.
  - Follow mine design and engineered drawings.
  - Select appropriate type of equipment according to job type and specifications.
  - Install lines and systems.
  - As per mine design and engineered drawings.
  - Isolate and lock out, de-energize and tag existing lines and systems.
  - Install hanging devices to secure to existing ground support mechanisms according to site standards.
  - Adding supporting mechanisms where appropriate.
  - De-isolate existing lines and systems.
- Conduct housekeeping activities.
  - Tear down, move and store tools and equipment in designated/ approved areas.
  - Remove debris.
  - Recycle materials.

# DRILLER

## Area of Competency 20: Install Staging

**THE FOLLOWING PRINCIPLES APPLY TO ALL TASKS UNDER THIS AREA OF COMPETENCY**

- ✓ Adhere to company policies and procedures.
- ✓ Adhere to government legislations.
- ✓ Adhere to engineered drawings.

**TASK 20.1  
PLAN FOR STAGING**

**✓ SUB-TASKS**

- |  |                              |
|--|------------------------------|
| 1. Check mine prints, layouts and standards. | 3. Determine location.       |
| 2. Determine type of staging.                | 4. Determine required tools. |

**✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Determine type of staging.
  - Select proper type of staging for specified application (wooden, steel, mechanical, pre-constructed, mobile).
  - Measure area for required materials.
- Check access and egress access and muster areas.
- Assess ground conditions.
- Select location.

**TASK 20.2  
INSTALL, CONSTRUCT AND INSPECT STAGING**

**✓ SUB-TASKS**

1. Receive and store materials in staging area and work platforms.
2. Select required tools.
3. Construct or place staging.

**✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Receive and store materials in staging area.                             <ul style="list-style-type: none"> <li>- Includes timbers, planks, stabilizers, framing.</li> <li>- Deliver materials and timber to staging area.</li> <li>- Store materials and timber in preparation for staging.</li> <li>- Inspect components for defects or damage.</li> </ul> </li> <li>• Select required tools.                             <ul style="list-style-type: none"> <li>- Select appropriate power and hand tools.</li> <li>- Demonstrate hand and power tool knowledge.</li> <li>- Follow working at heights policies and procedures, ensure certification is up to date.</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Construct or place staging.                             <ul style="list-style-type: none"> <li>- Follow mine prints, layouts and standards for locating, securing, aligning and spacing staging.</li> <li>- Install temporary support posts.</li> <li>- Determine application of ladders, lagging, planks, legs, chains, guard-rails, toe rails, anchors and wings.</li> <li>- Set up warning signs, barriers, fall arrest systems.</li> <li>- Support staging using appropriate chains, muck pile and/or spraggs.</li> <li>- Place and attach ladders to ensure free access.</li> </ul> </li> </ul> |
|---|---|

## **TASK 20.3** **INSTALL, CONSTRUCT AND INSPECT MECHANICAL STAGING**

### **SUB-TASKS**

1. Demonstrate knowledge of inspecting and constructing staging.
2. Set up equipment.

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### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Set up equipment.
  - Mechanized staging includes platform lift, scissor lift, loader, bucket elevator, forklifts, boom lift trucks, crane, raised climber, bucket loader.

## **TASK 20.4** **REMOVE AND STORE STAGING**

### **SUB-TASKS**

1. Dismantle staging.
2. Move and store staging.

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### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Dismantle staging.
  - Tear down staging using designated equipment.
- Move and store staging.
  - Move staging using designated equipment (scoops, service vehicles, trucks, manual means).
  - Store staging and equipment in pre-assigned area.
  - Ensure proper housekeeping.

# DRILLER

## Area of Competency 21: Conduct Lifting Operations

**THE FOLLOWING PRINCIPLES APPLY TO ALL TASKS UNDER THIS AREA OF COMPETENCY**

- ✓ Adhere to company policies and procedures.

**TASK 21.1  
PLAN LIFT**

**✓ SUB-TASKS**

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. Describe rigging, slinging and lifting equipment.</li> <li>2. Demonstrate equipment knowledge.</li> <li>3. Obtain authorization to conduct lift.</li> </ol> | <ol style="list-style-type: none"> <li>4. Select and use proper rigging/lifting equipment.</li> <li>5. Trained in appropriate lift mechanisms and rigging programs.</li> </ol> |
|---|--|

**✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Describe rigging and lifting equipment.                     <ul style="list-style-type: none"> <li>- Includes non-mechanized and mechanized lifting equipment.</li> <li>- May include hooks (with safety latches), slings or chains (specific to lifting), anchor (attached to an existing or temporary beam), hoisting plugs, weight indication devices.</li> <li>- Power-operated devices may have over-wind protection.</li> <li>- Chain blocks include chains and gears (enclosed in a metal case).</li> <li>- Come-a-long includes a ratchet lever.</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Obtain authorization to conduct lift.                     <ul style="list-style-type: none"> <li>- Establish daily logbook for overhead cranes.</li> </ul> </li> <li>• Select and use proper rigging/lifting equipment.                     <ul style="list-style-type: none"> <li>- Follow engineered lifting plan.</li> <li>- Determine weight and center of gravity.</li> <li>- Ensure proper use of PPE.</li> <li>- Ensure clear path for load travel.</li> <li>- Store slinging equipment in designated/approved area.</li> <li>- Inspect equipment for defects.</li> </ul> </li> <li>• Trained in appropriate lift mechanisms and rigging programs.                     <ul style="list-style-type: none"> <li>- Knowledge and understanding of rescue plan.</li> </ul> </li> </ul> |
|--|--|

**TASK 21.2  
SET UP LIFT**

**✓ SUB-TASKS**

1. Select lifting equipment.
2. Set up lifting equipment.
3. Prepare workplace for lift.

**✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Select lifting equipment.                     <ul style="list-style-type: none"> <li>- Use only certified rated rigging equipment.</li> <li>- Match capacity of lifting equipment to load.</li> <li>- Determine and inspect attachments to be used such as hooks, chains or slings (wire, rope, nylon).</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Set up lifting equipment.</li> <li>• Secure area using guards (banners, barricades).</li> <li>• Ensure devices are securely anchored.</li> <li>• Activate all necessary warning devices.</li> <li>• Prepare workplace for lift.                     <ul style="list-style-type: none"> <li>- Activate all necessary warning devices.</li> </ul> </li> </ul> |
|---|--|

## **TASK 21.3** **RIG AND SECURE LOAD**

### **SUB-TASKS**

1. Rig load.
2. Secure load.
3. Inspect load.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Rig load.
  - Ensure proper rigging training and qualifications.
  - Ensure proper footing.
  - Knowledge of Musculoskeletal Disorders injuries.
  - Attach selected rigging equipment.
  - Centre and balance load.
  - Use attachments to maintain balance.
  - Ensure load is free of all equipment (hoses, cables and other tools).
- Secure load.
  - Place shims, fillers and spacers to secure load.

## **TASK 21.4** **TEST AND MAKE THE LIFT**

### **SUB-TASKS**

1. Test lift.
2. Maintain line of sight to loader and spotter.
3. Move, place and secure load.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Test lift.
  - Conduct test lift as per site policies and procedures.
- Move, place and secure load.
  - Control load: lift load slowly, move load in one direction only, keep load as close to ground as possible, keep load clear from operating equipment.
- Ensure area is clear before lowering load.
- Release load.
- Use spotter and proper hand signals according to site policies and procedure.
- Do not handle load, have spotter steadying the tagline.
- Do not walk under load.



## TASK 21.5

# DISMANTLE AND STORE LIFTING EQUIPMENT

### ✓ SUB-TASKS

1. Remove lifting equipment.
2. Return workplace to normal condition.
3. Inspect, tag out, remove and replace damaged/defective lifting equipment.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Remove lifting equipment.
  - Remove hooks, slings and accessories.
  - Inspect equipment for defects and if unusable tag out and remove from service.
- Return workplace to normal condition.
  - Store slings according to manufacturer's specifications.
  - Ensure proper housekeeping.



# DRILLER

## Area of Competency 22: Surface Site Set-Up

## **TASK 22.1** **FOLLOW LAND USE PLANS AND/OR PERMIT GUIDELINES**

### **SUB-TASKS**

1. Identify type of set-up.
2. Interpret guidelines

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Identify type of set-up.
  - Includes drill pads, helicopter landing pad, dock for float planes, access routes (bridges), camp structures.
- Interpret guidelines.
  - Identify correct orientation.
  - Knowledge of water body limits.
  - Build to correct dimensions.
  - Use required tools and equipment.
  - Use required materials.
  - Meet specifications.
- Follow water consumption limits as per government guidelines.

## **TASK 22.2** **CONSTRUCT ACCESS ROUTES**

### **SUB-TASKS**

1. Determine access route.
2. Clear trees and brush.
3. Build road/access route.
4. Ensure completed road/access route is inspected.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Determine access route.
  - Obtain necessary permits from client or company.
  - Avoid sensitive areas (swamps, rivers, streams, lakes).
  - Avoid recreational and historical/cultural/archaeological sites, plantations, fish, wildlife and their habitats, mature trees and heavily wooded areas whenever possible.
  - Follow the edge of a swamp, grassy plain or lightly wooded area if possible.
  - Maintain a buffer zone between cleared areas and lakes, rivers or streams.
- Clear trees and brush.
  - Minimize potential for surface erosion.
  - Avoid cutting, pushing or dumping debris into water courses.
  - Fall trees away from standing water, in accordance with permit.
  - Remove dead limbs, dead standing trees and hang-ups.
  - Salvage and stack timber away from right-of-way and in scrub brush areas if possible.
- Build road/access route.
  - Use proper bridging techniques.
  - Extend corduroy two feet on each side of equipment, if applicable.
  - Travel ways must be free of all obstructions.
  - Grade roads/access routes.
  - Apply additional materials as needed (for additional support, to prevent erosion).
  - Install signage and barricades.
- Ensure completed road/access route is inspected.
  - Communicate completion of road/access route to supervisor for inspection.
  - Inspection may include road width, ground, overhead obstructions, proper installation of corduroy, construction of bridges.



## TASK 22.3

# BUILD AND MAINTAIN CAMPS

### ✓ SUB-TASKS

1. Determine type of camp required.
2. Select location of camp site.
3. Build camp.
4. Install toilet and waste facilities.
5. Maintain camp.
6. Restore camp location to acceptable environmental conditions.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Determine type of camp required.
  - Factors include length of contract, time of year (season) number of people employed, method of transportation (air, water, road), provincial and rural regulations (fire and travel).
  - Obtain permits prior to building camps.
- Select location of camp site.
  - Follow specification for camp location in the permit.
  - Situate camp site on an elevated or well-drained site.
  - Locate camp sites 50 metres away from the shoreline of a lake or river, if possible.
- Build camp.
  - Follow construction plans and permits.
  - Ensure that foundations are solid to prevent sagging or twisting.
  - Build camp structures at least 15 metres apart.
  - Separate kitchen and sleeping quarters.
- Install toilet and waste facilities.
  - Facilities may include latrines, sumps or lagoons (storage areas for waste or grey water or spill fluids), waste disposal sites.
- Maintain camp.
  - Disinfect contents of pit toilets.
  - Treat cesspool for cookery sinks with lime daily.

# DRILLER

## Area of Competency 23: Perform Drilling Operations



## TASK 23.2

# DEMONSTRATE HAND DRILL KNOWLEDGE

### ✓ SUB-TASKS

1. Train and become authorized for proper use and operation of all hand drills.
2. Identify type and size of drill bits and their applications.
3. Identify types and applications of drill steel and drill rods.
4. Select appropriate type and size of pipe and fittings.
5. Visually inspect drill.
6. Set up drill.
7. Conduct pre-operational checks before air and water are hooked up.
8. Conduct pre-operational checks after air and water are turned on.
9. Mount drill steel.
10. Dismantle drill.
11. Maintain drill.
12. Store drilling equipment.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Train and become authorized for proper use and operation of all equipment.
  - Follow safety guidelines (wear protective equipment, shut off appropriate valve, bleed all lines, secure all pipes, follow proper lock out procedures, wash or blow out lines to clear obstructions, install header, check line for leak, ensure 'whip check' is properly installed on air hose, where required).
- Identify types and applications of drill steel and drill rods.
  - Standard steel, auger steel, threaded steel, thread one- end, hex shank other end, threaded both ends, sectional drill rods.
  - Eliminate damaged or bent steel.
  - Send rejected steel to surface for recycling.
- Visually inspect drill.
  - Inspect equipment components for damage (spike, outer casing, air gooseneck, leg feed control, hand guard, side rod, exhaust port, throttle control, water hose and valve, inner casing, air leg, chuck, retainer, water tube).
- Set up.
  - Ensure area has been properly prepared for drilling.
  - Ensure proper back clearance.
  - Assemble all necessary tools and supplies.
- Pre-operational checks before air and water are hooked up.
  - Blow out air and water hoses.
  - Shut off and bleed air before filling lubricator with specified lubricant.
  - Ensure all controls are in 'off' position.
  - Hook up and securely tighten hoses.
  - Ensure spike is placed at or below foot level.
  - Check air and water goosenecks.
  - Ensure all control handles move freely.
  - Ensure there is no rock in chuck of machine.
  - Check chuck or steel for wear.
  - Make sure threads on all fittings are clean and tight.
  - Put rubber hand guard in place over leg air feed control.
  - Check side rods to make sure they are tight.
  - Check leg advance.
- Ensure spike on leg is present.
- Ensure all controls are in 'off' position.
- Ensure chuck is turning when throttle is turned on with leg air feed off.
- If water valve is attached to machine, turn valve on to chuck.
- Mount drill steel.
  - Follow proper procedures.
  - Place steel properly to avoid hazards.
  - Keep side rods tight.
- Dismantle drill.
  - Shut off air and water at headers.
  - Bleed water line at drill and slowly loosen hoses.
  - Disconnect hoses.
  - Coil hoses neatly.
  - Store hoses in appropriate place.
  - Ensure clear travel way.
- Maintain drill.
  - Ensure all goosenecks are tight.
  - Keep screens on goosenecks clean.
  - Replace plugged water tube.
  - If steel retainer does not work properly, send machine for repairs.
  - Identify any defects.
  - Assess severity of defect.
  - Repair defect according to company standards.
  - Report defect and repair to appropriate personnel.
- Store drilling equipment.
  - Where it will not be in way of fly rock from blasting.
  - Where it will not be a hazard to anyone or any machinery passing by.
  - If drill is not placed on a rack, stand drill up against wall where it cannot fall or be knocked over.
  - If drill is not to be used for a long time, pour oil into chuck to prevent rusting.

## **TASK 23.3** **OPERATE STOPER**

### **SUB-TASKS**

1. Demonstrate hand drill knowledge.
2. Drill hole.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Demonstrate hand drill knowledge.
  - Ensure water valve is turned on before drilling.
  - Prepare level working area.
- Drill hole.
  - Position stoper properly.
  - Position yourself according to recommended procedures.
  - Monitor conditions (proper water flow, loosening of ground, loosening of hoses, general condition of drill).
  - Watch for loose rock while collaring.
  - Check scale while drilling.
  - Carry stoper over your hip or shoulder (three-point contact) to move drill.

## **TASK 23.4** **OPERATE JACKLEG**

### **SUB-TASKS**

1. Demonstrate hand drill knowledge.
2. Drill hole.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Demonstrate hand drill knowledge.
  - Tighten nut on leg and ensure end of leg is not plugged with mud.
  - Ensure bottom of leg is in good condition and secured to prevent slippage.
  - Check leg advance.
  - Ensure leg moves freely.
  - Ensure chuck is turning when throttle is turned on with leg air feed off.
  - Ensure strong stream of water is flowing from chuck of machine.
- Drill hole.
  - Position jackleg properly.
  - Use proper anchor.
  - Watch for loose rock while collaring.
  - Check scale while drilling.
  - Carry jackleg over your shoulder to move drill.

## **TASK 23.6** **MAINTAIN DRILL SUPPORT SERVICES**

### **SUB-TASKS**

1. Manage water supply.
2. Maintain inventory.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Manage water supply.
  - Monitor water flow and pressure.
  - Inspect hoses regularly (check for leaks, punctures, freezing (permafrost)).
  - Keep pump running (monitor fluid levels, refuel pump motor).
  - Mix in appropriate drill additives as required for hole conditions (casing, caving, loss of circulation, vibration, stabilization, high water pressure, swelling grounds, faulting).
- Maintain inventory.
  - Maintain supply of consumables (fuel, core boxes, core blocks, rods, additives).
  - Inform supervisor of inadequate supply of consumables, if required.

## **TASK 23.7** **PREPARE AND MAINTAIN ALL IN-HOLE TOOLS**

### **SUB-TASKS**

1. Identify components of in-hole tools.
2. Prepare in-hole tools.
3. Maintain in-hole tools.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Identify components of in-hole tools.
  - Components may include inner tube, inner tube extension, latch head assembly, lifter case assembly.
- Prepare in-hole tools.
  - Attach latch head to inner tube.
  - Check lifter case assembly and attach to inner tube, if required.
- Maintain in-hole tools.
  - Visually check outside of tube for defects (burrs, bends, flattened threads).
  - Inspect inner tube assembly for wear (check threads, look for damage (bulged tube), latch head assembly).
  - Grease latch head assembly.
- Maintain cutting tools.
- Maintain fishing tools.

## **TASK 23.8** **GROUT DRILL HOLES**

### **SUB-TASKS**

1. Select grouting equipment.
2. Demonstrate hand and power tool knowledge.
3. Perform grouting.
4. Maintain grouting equipment.
5. Tear down and store grouting equipment.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Select grouting equipment.
  - Identify equipment needed (pump, pressure-rated hoses, plugs, grout type, additives).
- Demonstrate hand and power tool knowledge.
  - Check power source, fluid levels, pressure rated hoses.
  - Inspect principal components of pumps and gauges, including guards and controls.
- Perform grouting.
  - Prepare grout mixture (cement, chemicals, water, additives).
  - Mix to prescribed ratios.
  - Install grout plugs when required.
  - Pump grout mixture into the hole as specified.
- Maintain grouting equipment.
  - Flush grouting system.
  - Disconnect power sources.
  - Clean all equipment.
  - Check controls, lubrication, general conditions of pump, missing tank, hoses and gauges for worn/defective components.
  - Lubricate grease fittings.
- Tear down and store grouting equipment.
  - Store in designated/approved area.

## **TASK 23.9** **DRILL ON ICE**

### **SUB-TASKS**

1. Monitor ice conditions.
2. Adapt support services for operating on ice.
3. Sling casings.
4. Environment.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Monitor ice conditions.
  - Monitor thickness over entire route, conditions (open holes, large cracks, inadequate ice, quality of ice (blue vs. white ice), freeboard (the difference between the height of the water vs. the height of the ice), load capacity of the ice (in relation to weight of equipment, materials and supplies).
- Adapt support services for operating on ice.
  - Mark off work area with flags or barricades.
  - Use sills or timbers of appropriate length to distribute weight evenly.
  - Maintain air flow around the drill to allow heat to escape.
  - Monitor ice for changing conditions.
- Make hole for pump suction, using ice auger, in a safe and marked spot.
  - Set up environmental equipment to collect drill cuttings.
  - Follow procedures for installing casing (double casing, slinging).
  - Grout drill hole and remove casing after drill operations are complete.
- Environment.
  - Limit amounts of stored fuel on hand.
  - Use extreme caution when fueling.
  - Dispose of cuttings as required by regulations.



## TASK 23.10 DRILL FROM A BARGE

### ✓ SUB-TASKS

1. Monitor marine conditions.
2. Adapt set-up process.
3. Adapt support services for operating on barge.
4. Environment.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Monitor marine conditions.
  - Monitor water depth, obstructions (dead heads, shoals), weather (windstorms, waves).
- Adapt set-up process.
  - Check installations of ancillary equipment and position of drill on barge.
  - Check water depth for anchoring purposes.
  - Flag anchor lines.
  - Ensure warning lights are installed on barge and supply boat.
  - Install secondary containment boom around barges, e.g., socks.
- Adapt support services for operating on barge.
  - Set up environmental equipment to collect drill cuttings.
  - Follow procedures for installing casing (double casing).
  - Grout drill hole and remove casing after drill operations are complete.
- Environment.
  - Limit amounts of stored fuel on hand.
  - Use extreme caution when fueling.
  - Dispose of cuttings as required by regulations.

## TASK 23.11 TRANSPORT DRILL

### ✓ SUB-TASKS

1. Plan surface move.
2. Plan underground move.
3. Move drill and supplies.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Plan surface move.
  - Use maps.
  - Identify hazards, including ground conditions, hydro lines, weather conditions, ice routes.
  - Land routes – determine need to construct access routes, build bridges and/or install culverts.
  - Water routes – be aware of hazards (underwater rock or shoals for entire pre-designated route).
  - Determine load size.
  - Determine moving sequence (need to construct route, identify moving order of components and materials, identify equipment needed to make move, identify permits needed to make move, identify permits or licenses required).
- Plan underground move.
  - Read layout.
  - Identify hazards and potential hazards along entire route to destination.
  - Determine moving method.
  - Determine equipment required.
  - Moving equipment may include scoop, utility vehicle, motor, forklift, cage.
- Move drill and supplies.
  - Load components and materials.
  - Select proper tie-downs to secure load.
  - Co-ordinate with others to ensure timely and efficient move.
  - Unload at destination.

# DRILLER

## Area of Competency 24: Perform Diamond Drilling Operations



## TASK 24.1

# UNDERSTAND AND DEMONSTRATE DIAMOND DRILL KNOWLEDGE

### ✓ SUB-TASKS

1. Train and become authorized for proper use and operation of diamond drill.
2. Prepare drill site.
3. Set up drill.
4. Install safety equipment.
5. Conduct pre-operational checks.
6. Start drill.
7. Shut down drill.
8. Maintain drill.
9. Refuel drill.
10. Tear down drill.
11. Environment considerations/protection.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Train and become authorized for proper use and operation of drill.
  - Types of diamond drills include self-propelled, bar- mounted, skid-mounted, rail.
  - Drills may be powered by air, electricity or diesel.
- Prepare drill site.
  - Site must be of adequate size to accommodate equipment and free of obstructions and hazards.
  - Determine need to use cribbing to level drill.
  - Follow surface site plan to allocate space for ancillary equipment, fuel storage, garbage disposal.
  - Check underground site for services (air, water, power, ventilation), ground support, ground condition, hazards (missed holes, bootlegs, lifters).
  - Extend underground services.
- Set up drill.
  - Position drill as per drill layout.
  - Crib drill with timbers, as required.
  - Install underground staging as required.
  - Set up drill on surface following manufacturers specifications (assemble or extend mast, affix associated components such as rod racks, basket, cables, lanyards, fall arrest system, lights, stiff leg, guy wires as required, raise mast/tower to correct inclination, anchor and secure stiff legs and guy wires to appropriate/ designated location (drill shack).
  - Set up drill underground as per drill layout (front sight and back sight, anchor drill).
  - Set up water supply system (set up pump and lay out water hoses, bring water supply to drill tub and/or cooler system, connect water swivel to water swivel hose and pressure pump).
- Install safety equipment.
  - Includes: fire extinguishers in drill shack and pump shack, seasonal firefighting equipment, emergency response equipment, spill kits, guard rails, communication devices, fall protection, hazardous gas tester, approved first aid kit, adequate lighting for night work.
  - Ensure all safety devices are in place, secure and in good operating condition (spark arrester).
- Conduct pre-operational checks.
  - Use pre-op checklist and check condition of components (mechanical and rotating components, fluid levels (Fuel, oil, hydraulic fluid), hydraulic and fuel fittings, guarding, safety equipment, work environment (lighting, temperature), environmental checks (fluid leaks - hydraulic and fuel, air quality, exhaust leaks).
- Start drill.
  - Put controls into neutral position.
  - Follow manufacturer's specifications for start-up.
  - Turn on power source.
  - Monitor gauges to ensure equipment is operating properly within manufacturer's parameters (fluid levels, water pressure, system hydraulic pressures).
  - Check drill functions on equipment (drill rod threading, drill head rotation, chuck, foot clamp, pump, wireline winch).
  - Listen for unusual sounds.
  - Report deficiencies to supervisor.
  - Monitor fuel levels during operation.
- Shut down.
  - Place controls in neutral.
  - Turn off water going to the hole, power source on panel, air.
  - Reduce to idle speed.
  - Conduct post-operational check with checklist (guards, fluid levels).
- Maintain drill.
  - Inspect bit face for signs of damage and wear (burning, ringing, breakage) change bit if necessary.
  - Check core barrel assembly and change core barrel, if necessary.
  - Check gauge of reaming shell.
  - Replace or adjust components.
  - Lubricate equipment according to manufacturer's specifications.
- Refuel.
  - Monitor drill fuel levels during operation.
- Tear down diamond drill.
  - Remove safety features.
  - Lower mast.
  - Remove mast accessories.

- Remove anchors.
  - Disassemble components (disconnect hoses).
  - Prepare and secure loads for moving.
  - Use approved fuel pumping equipment.
  - Inspect terrain and remediate site prior to leaving.
  - Ensure no hazards are left behind.
- Environment considerations/protection.
    - Manage fuel and other hazardous materials.
    - Use approved fuel pumping equipment.
    - Inspect terrain and remediate site prior to leaving.
    - Ensure no hazards are left behind.



## TASK 24.2

# UNDERSTAND AND EXPLAIN ROCK HARDNESS IN RELATION TO BIT MATRIX HARDNESS

### ✓ SUB-TASKS

1. Explain the MOHs scale.
2. Explain the difference between a hard bit matrix and a soft bit matrix.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- No additional references or examples.



## TASK 24.3

# EXPLAIN DIFFERENT DIAMOND BIT TYPES AND ATTRIBUTES

### ✓ SUB-TASKS

1. Ability to select water ways.
2. Knowledge of Diamond impregnation.
3. Ability to explain bit face type/area.
4. Ability to explain Tapered or standard.
5. Ability to explain HWL vs. HWL3 or NWL vs. NWL3.
6. Ability to explain what types of bit faces will strip (sharpen) easiest.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- No additional references or examples.



## TASK 24.4

# DEMONSTRATE UNDERSTANDING OF BIT USAGE

1. Knowledge of reason for Stripping of the bit (sharpening).
2. Knowledge of reason for outer bit wear.
3. Knowledge of reason for inner bit wear.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- No additional references or examples.



## TASK 24.5 UNDERSTAND BASIC GEOLOGY

### ✓ SUB-TASKS

1. Explain different OVB.
2. Explain different rock types.
3. Understand and explain bit selections based on geology.
4. Understand and explain the different impacts between a consolidated hard rock and an unconsolidated hard rock when considering coring and bit selection.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Explain different OVB ground types.
  - Including but not limited to; clays, silts, sands, gravels, till, consolidated, etc.
- Explain different rock types.
  - Including but not limited to; extrusive volcanics, intrusive volcanics, sedimentary and metamorphic.



## TASK 24.6 OPERATE DIAMOND DRILL

### ✓ SUB-TASKS

1. Demonstrate diamond drill knowledge.
2. Read and maintain daily drill report/logbook.
3. Drill bore holes.
4. Complete core tube activities.
5. Trip drill rods and casing.
6. Complete testing requirements.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Read and maintain daily drill report/logbook..
  - Take corrective action based on report from previous shift.
  - Make note of hazards, discrepancies at the drill site, abnormalities in the drill hole (drill misalignment, damage bits, broken rods, shell/core barrel/hole deviations).
- Drill bore holes.
  - Collar hole and set casing.
  - Lower core barrel assembly.
  - Commence core drilling operations as specified in layout (hole size, dip, depth).
  - Identify adverse conditions while drilling (bit/tube blockage, vibration, bit polishing, loss circulation, worn bit, faulted ground).
  - Make adjustments to drilling.
  - Identify when tube is full or blocked.
  - Break the core.
- Complete core tube activities.
  - Remove the inner tube with wire line overshot.
  - May use a pumping overshot to retrieve inner tube.
  - Control extraction of inner tube through controlled release of water to prevent runaway tubes.
  - Insert empty inner tube.
  - Add new drive rod.
  - Pump tube to latch.
  - Resume drilling.
- Move inner tube assembly to core removal area.
- Trip drill rods and casing.
  - Identify reasons for tripping rods (change bit, change core barrel, wedging, remove core due to mis latch, end of hole).
  - Pull back and remove rod(s) as required.
  - Pull rods (retract rod[s] to rod joint for breaking, break rod with appropriate tools, remove rod, rack rod[s]).
  - Continue until core barrel is at surface.
  - Lower rods (insert rod[s] to rod joint for making, torque rod[s] with appropriate tools, add additional rod[s]).
- Complete testing requirements.
  - Determine trajectory of the hole.
  - Pull back and remove rod(s) as required.
  - Insert survey tool, e.g., electronic or mechanical compass.
  - Conduct tests.
  - Take reading.
  - Remove tool.
  - Document readings as required.
  - Resume drilling.

## **TASK 24.7** **RECOVER CORE SAMPLE**

### **SUB-TASKS**

1. Remove core sample from core tube.
2. Place core in core box tray.
3. Prepare core box(es) for transportation.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Remove core sample from core tube.
  - Remove latch head assembly.
  - Place top end of core tube in tray or core box careful not to damage tube.
  - Remove core from tube.
  - Ensure all core has been removed from inner tube.
- Place core in core box tray.
  - Start from top left corner of the tray.
  - Fill each successive groove to the right from top to bottom.
  - Match core and indicate depth with a marked core block.
  - Orient core, if required.
  - Ensure core is clean and free of any contaminants.
  - Clean out tube with running water.
  - Visually inspect tube for any defects.
- Prepare core box(es) for transportation.
  - Secure box(es).
  - Identify box(es) by marking with the required information inside and outside.
  - Seal box(es), using approved method (fasten with haywire, tape, rubber bands, screws or nails, fiber filament tape).
  - Take core box(es) to designated area.

## **TASK 24.8** **PERFORM DIRECTIONAL DRILLING**

### **SUB-TASKS**

1. Test direction of the hole.
2. Review plan with the client.
3. Correct the deviation.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Test direction of hole.
  - Survey the hole.
- Apply or correct the deviation.
  - Install retrievable wedge, steep wedge, steerable tools.

# DRILLER

## Area of Competency 25: Perform Mud Rotary Drilling Operations



## TASK 25.1

# UNDERSTAND AND DEMONSTRATE MUD ROTARY DRILL KNOWLEDGE

### ✓ SUB-TASKS

1. Train and become authorized for proper use and operation of mud rotary drill.
2. Prepare drill site.
3. Set up drill.
4. Install safety equipment.
5. Conduct pre-operational checks.
6. Start drill.
7. Shut down drill.
8. Maintain drill.
9. Refuel drill.
10. Tear down drill.
11. Environment considerations/protection.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Prepare drill site.
  - Site must be of adequate size to accommodate equipment and free of obstructions and hazards.
  - Follow surface site plan to allocate space for ancillary equipment, fuel storage, garbage disposal.
  - Check underground site for services (air, water, power, ventilation), ground support, ground condition, hazards (missed holes, bootlegs, lifters).
  - Extend underground services.
- Set up drill.
  - Position drill as per drill layout.
  - Crib drill with timbers, if/as required.
  - Set up drill following manufacturers specifications.
  - Set up water supply system (set up pump and lay out water hoses, bring water supply to drill tub and/or cooler system, connect water swivel to water swivel hose and pressure pump).
- Install safety equipment.
  - Includes: fire extinguishers in drill shack and pump shack, seasonal firefighting equipment, emergency response equipment, spill kits, guard rails, communication devices, fall protection, hazardous gas tester, approved first aid kit, adequate lighting for night work.
  - Ensure all safety devices are in place, secure and in good operating condition (spark arrester).
- Conduct pre-operational checks.
  - Use pre-op checklist and check condition of components.
- Start drill.
  - Put controls into neutral position.
  - Follow manufacturer's specifications for start-up.
  - Turn on power source.
  - Monitor gauges to ensure equipment is operating properly within manufacturer's parameters (fluid levels, water pressure, system hydraulic pressures).
  - Check drill functions on equipment (drill rod threading, drill head rotation, chuck, foot clamp, pump, wireline winch).
- Listen for unusual sounds.
  - Report deficiencies to supervisor.
  - Monitor fuel levels during operation.
- Shut Down
  - Place controls in neutral.
  - Turn off water going to the hole, power source on panel, air.
  - Reduce to idle speed.
  - Conduct post-operational check with checklist (guards, fluid levels).
- Maintain drill.
  - Replace or adjust components.
  - Lubricate equipment according to manufacturer's specifications.
- Refuel.
  - Monitor drill fuel levels during operation.
- Tear down drill.
  - Remove safety features.
  - Lower mast.
  - Remove mast accessories.
  - Disassemble components (disconnect hoses).
  - Prepare and secure loads for moving.
  - Use approved fuel pumping equipment.
  - Inspect terrain and remediate site prior to leaving.
  - Ensure no hazards are left behind.
- Environment considerations/protection.
  - Manage fuel and other hazardous materials.
  - Use approved fuel pumping equipment.
  - Inspect terrain and remediate site prior to leaving.
  - Ensure no hazards are left behind.





## TASK 25.2

# UNDERSTAND AND OPERATE MUD PUMP/MUD PUMP SELECTION

### ✓ SUB-TASKS

1. Understanding borehole size/depth impacts of mud pump selection.
2. Understand ground conditions and type impacting mud pump selection.
3. Understand hydraulic requirements of selected mud pump and hydraulic supply from the drill.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Understanding borehole size/depth impacts of mud pump selection
  - Consider pressure and volume.
- Understand ground conditions and type impacting mud pump selection.
  - Consider suction and discharge.
- Understand hydraulic requirements of selected mud pump and hydraulic supply from the drill.



## TASK 25.3

# UNDERSTAND AND DEMONSTRATE THE DESIGN AND MIXING OF DRILL MUDS

### ✓ SUB-TASKS

1. Understand and demonstrate mixing drill muds with hydraulic mixer.
2. Understand and demonstrate the mole method.
3. Understand and demonstrate how to measure viscosity.
4. Knowledge and understanding of what different muds do.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Knowledge and understanding of what different muds do.
  - Including but not limited to; PAC's, bentonite powder, polymers, lubricants (long string and short string), clay inhibitors, calcium nitrate, coagulants, flocculants etc.)

## **TASK 25.4** **PREPARE AND MAINTAIN MUD RECIRCULATION SYSTEMS**

### **SUB-TASKS**

1. Understand and demonstrate setting up the recirculation tank(s).
2. Understand and demonstrate the installation of casing bowls, T's, cans and other cuttings control additions.
3. Understand and demonstrate how to setup and run the flocc tanks.
4. Understand and demonstrate how to add additional muds to recirculation systems during drilling.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Understand and demonstrate the installation of cuttings control additions.
  - Including but not limited to; casing bowls, T's, cans and other cuttings control additions.

## **TASK 25.5** **UNDERSTAND BASIC GEOLOGY**

### **SUB-TASKS**

1. Explain different OVB ground types; clays, silts, sands, gravels, till, consolidated, etc.
2. Explain different rock types; extrusive volcanics, intrusive volcanics, sedimentary and metamorphic.
3. Understand and explain bit selections based on geology.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Explain different OVB ground types.
  - Including but not limited to; clays, silts, sands, gravels, till, consolidated, etc.
- Explain different rock types.
  - Including but not limited to; extrusive volcanics, intrusive volcanics, sedimentary and metamorphic.

## **TASK 25.6** **OPERATE MUD ROTARY DRILL**

### **SUB-TASKS**

1. Knowledge and understanding of mud rotary requirements.
2. Demonstrate the ability to set surface casing.
3. Demonstrate controlled rate of penetration in relation to ground conditions and circulation (clearing of cuttings).
4. Demonstrate the ability to maintain a stable and open borehole to total depth.
5. Demonstrate the working mud system and flocculation of cuttings.
6. Add and remove drill steel.
7. Understand and demonstrate testing requirements.
8. Understand and demonstrate installation requirements.
9. Demonstrate cement/grouting of the borehole at completion.
10. Knowledge and understanding on how to control heave.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- No additional references or examples.

# DRILLER

## Area of Competency 26: Perform Air Rotary Drilling Operations



## TASK 26.1

# UNDERSTAND AND DEMONSTRATE AIR ROTARY DRILL KNOWLEDGE

### ✓ SUB-TASKS

1. Train and become authorized for proper use and operation of air rotary drill.
2. Prepare drill site.
3. Set up drill.
4. Install safety equipment.
5. Conduct pre-operational checks.
6. Start drill.
7. Shut down drill.
8. Troubleshoot drilling techniques.
9. Maintain drill.
10. Refuel drill.
11. Tear down drill.
12. Environment considerations/protection.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Train and become authorized for proper use and operation of air rotary drill.
- Prepare drill site.
  - Site must be of adequate size to accommodate equipment and free of obstructions and hazards.
  - Follow surface site plan to allocate space for ancillary equipment, fuel storage, garbage disposal.
  - Check underground site for services (air, water, power, ventilation), ground support, ground condition, hazards (missed holes, bootlegs, lifters).
  - Extend underground services.
- Set up drill.
  - Position drill as per drill layout.
  - Crib drill with timbers, if/as required.
  - Install underground staging if/as required.
  - Set up drill following manufacturers specifications.
  - Set up water supply system (set up pump and lay out water hoses, bring water supply to drill tub and/or cooler system, connect water swivel to water swivel hose and pressure pump).
- Install safety equipment.
  - Includes: fire extinguishers in drill shack and pump shack, seasonal firefighting equipment, emergency response equipment, spill kits, guard rails, communication devices, fall protection, hazardous gas tester, approved first aid kit, adequate lighting for night work.
  - Ensure all safety devices are in place, secure and in good operating condition (spark arrester).
- Conduct pre-operational checks.
  - Use pre-op checklist and check condition of components.
- Start drill.
  - Put controls into neutral position.
  - Follow manufacturer's specifications for start-up.
  - Turn on power source.
  - Monitor gauges to ensure equipment is operating properly within manufacturer's parameters (fluid levels, water pressure, system hydraulic pressures).
- Check drill functions on equipment (drill rod threading, drill head rotation, chuck, foot clamp, pump, wireline winch).
- Listen for unusual sounds.
- Report deficiencies to supervisor.
- Monitor fuel levels during operation.
- Shut down
  - Place controls in neutral.
  - Turn off water going to the hole, power source on panel, air.
  - Reduce to idle speed.
  - Conduct post-operational check with checklist (guards, fluid levels).
- Troubleshoot drilling techniques.
  - Including, but not limited to: skin friction, no circulation, hammer not firing but there is circulation, hammer is watered out, drill rods advancing but casing is not moving, retrieve stuck casing, etc.
- Maintain drill.
  - Replace or adjust components.
  - Lubricate equipment according to manufacturer's specifications.
- Refuel.
  - Monitor drill fuel levels during operation.
- Tear down drill.
  - Remove safety features.
  - Lower mast.
  - Remove mast accessories.
  - Disassemble components (disconnect hoses).
  - Prepare and secure loads for moving.
  - Use approved fuel pumping equipment.
  - Inspect terrain and remediate site prior to leaving.
  - Ensure no hazards are left behind.
- Environment considerations/protection.
  - Manage fuel and other hazardous materials.
  - Use approved fuel pumping equipment.
  - Inspect terrain and remediate site prior to leaving.
  - Ensure no hazards are left behind.



## TASK 26.2

# UNDERSTAND CFM/PSI REQUIREMENTS SURROUND BOREHOLE DIAMETER AND DEPTH

### ✓ SUB-TASKS

1. Understand up hole velocity based on diameter and CFM.
2. Understand pressure loss in relations to depth/rods.
3. Understand CFM to water volume constraints.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- No additional references or examples.



## TASK 26.3

# UNDERSTAND DTH HAMMER AND TOOLING

### ✓ SUB-TASKS

1. Understand and demonstrate DTH hammer assembly and function.
2. Understand and demonstrate DTH hammer inspections.
3. Understand and demonstrate casing advancement systems.
4. Understand and demonstrate foot valve usage, inspection and replacement.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Understand and demonstrate DTH hammer assembly and function.
  - Knowledge of dis-assembly risks represented by potentially pressurized hammers and sudden release of hammers over-tightened due to percussive drilling.
- Understand and demonstrate casing advancement systems.
  - Including but not limited to; ODEX, Drop off, etc.



## TASK 26.4

# UNDERSTAND DRILLING FLUID USAGES AND REQUIREMENTS

### ✓ SUB-TASKS

1. Knowledge and understand how to deal with skin friction.
2. Knowledge and understand how to lubricate hammer.
3. Knowledge and understand how to increase CFM without a larger compressor.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- No additional references or examples.

## **TASK 26.5** **UNDERSTAND AND DEMONSTRATE TROUBLESHOOTING AIR COMPRESSORS**

### **SUB-TASK**

1. Knowledge and understanding of how to troubleshoot air compressors.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Knowledge and understanding of how to troubleshoot air compressors.
  - Including but not limited to; not producing volume (PSI/CFM), low pressure, air compressor fluid discharging from drill rods, over pressuring, winter techniques, compressor condensation, maintenance, safety devices, etc.

## **TASK 26.6** **UNDERSTAND BASIC GEOLOGY**

### **SUB-TASKS**

1. Explain different OVB ground types.
2. Explain different rock types.
3. Understand and explain bit selections based on geology.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Explain different OVB ground types.
  - Including but not limited to; clays, silts, sands, gravels, till, consolidated, etc.
- Explain different rock types.
  - Including but not limited to; extrusive volcanics, intrusive volcanics, sedimentary and metamorphic.

## **TASK 26.7** **OPERATE AIR ROTARY DRILL**

### **SUB-TASKS**

1. Demonstrate understanding of air rotary requirements, CFM and PSI.
2. Demonstrate the ability to set ODEX (or other) casing to total depth or bedrock.
3. Demonstrate controlled rate of penetration in relation to ground conditions and circulation (clearing of cuttings).
4. Demonstrate the ability to maintain a stable and open borehole to total depth and understanding of casing friction.
5. Demonstrate ability to open hole RAB.
6. Adding and removing drill steel.
7. Demonstrate and understand testing requirements.
8. Demonstrate and understand installation requirements.
9. Demonstrate cement/grouting of the borehole at completion.
10. Knowledge and understanding on how to control heave.

### **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- No additional references or examples.

# DRILLER

## Area of Competency 27: Perform Sonic Drilling Operations

**TASK 27.1****UNDERSTAND AND DEMONSTRATE SONIC DRILL KNOWLEDGE****✓ SUB-TASKS**

1. Train and become authorized for proper use and operation of diamond drill.
2. Prepare drill site.
3. Set up drill.
4. Install safety equipment.
5. Conduct pre-operational checks.
6. Start drill.
7. Shut down drill.
8. Maintain drill.
9. Refuel drill.
10. Tear down drill.
11. Environment considerations/protection.

**✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Train and become authorized for proper use and operation of drill.
  - Types of diamond drills include self-propelled, bar-mounted, skid-mounted, rail.
  - Drills may be powered by air, electricity or diesel.
- Prepare drill site.
  - Site must be of adequate size to accommodate equipment and free of obstructions and hazards.
  - Determine need to use cribbing to level drill.
  - Follow surface site plan to allocate space for ancillary equipment, fuel storage, garbage disposal.
  - Check underground site for services (air, water, power, ventilation), ground support, ground condition, hazards (missed holes, bootlegs, lifters).
  - Extend underground services.
- Set up drill.
  - Position drill as per drill layout.
  - Crib drill with timbers, as required.
  - Install underground staging as required.
  - Set up drill on surface following manufacturers specifications (assemble or extend mast, affix associated components such as rod racks, basket, cables, lanyards, fall arrest system, lights, stiff leg, guy wires as required, raise mast/tower to correct inclination, anchor and secure stiff legs and guy wires to appropriate/designated location (drill shack).
  - Set up drill underground as per drill layout (front sight and back sight, anchor drill).
  - Set up water supply system (set up pump and lay out water hoses, bring water supply to drill tub and/or cooler system, connect water swivel to water swivel hose and pressure pump).
- Install safety equipment.
  - Includes: fire extinguishers in drill shack and pump shack, seasonal firefighting equipment, emergency response equipment, spill kits, guard rails, communication devices, fall protection, hazardous gas tester, approved first aid kit, adequate lighting for night work.
  - Ensure all safety devices are in place, secure and in good operating condition (spark arrester).
- Conduct pre-operational checks.
  - Use pre-op checklist and check condition of components (mechanical and rotating components, fluid levels (Fuel, oil, hydraulic fluid), hydraulic and fuel fittings, guarding, safety equipment, work environment (lighting, temperature), environmental checks (fluid leaks - hydraulic and fuel, air quality, exhaust leaks).
- Start drill.
  - Put controls into neutral position.
  - Follow manufacturer's specifications for start-up.
  - Turn on power source.
  - Monitor gauges to ensure equipment is operating properly within manufacturer's parameters (fluid levels, water pressure, system hydraulic pressures).
  - Check drill functions on equipment (drill rod threading, drill head rotation, chuck, foot clamp, pump, wireline winch).
  - Listen for unusual sounds.
  - Report deficiencies to supervisor.
  - Monitor fuel levels during operation.
- Shut down.
  - Place controls in neutral.
  - Turn off water going to the hole, power source on panel, air.
  - Reduce to idle speed.
  - Conduct post-operational check with checklist (guards, fluid levels).
- Maintain drill.
  - Inspect bit face for signs of damage and wear (burning, ringing, breakage) change bit if necessary.
  - Check core barrel assembly and change core barrel, if necessary.
  - Check gauge of reaming shell.
  - Replace or adjust components.
  - Lubricate equipment according to manufacturer's specifications.
- Refuel.
  - Monitor drill fuel levels during operation.





## TASK 27.2

# UNDERSTAND AND DEMONSTRATE SAFE ANCILLARY EQUIPMENT SETUP

### ✓ SUB-TASKS

1. Support unit.
2. Crane/winch support.
3. Sample collection area.
4. Personnel ergonomics.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- No additional references or examples.



## TASK 27.3

# UNDERSTAND AND DEMONSTRATE THE DESIGN AND MIXING OF BASIC DRILL MUDS

### ✓ SUB-TASKS

1. Understand and demonstrate mixing drill muds with hydraulic mixer.
2. Understand and demonstrate the mole method.
3. Understand and demonstrate how to measure viscosity.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- No additional references or examples.



## TASK 27.4

# UNDERSTAND BASIC GEOLOGY

### ✓ SUB-TASKS

1. Adjust oscillation frequency based on geology.
2. Adjust oscillation frequency to match ROP and ground type.
3. Explain different OVB ground types.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Explain different OVB ground types.
  - Including but not limited to; clays, silts, sands, gravels, till, consolidated, etc.



## TASK 27.5

### PERFORM SONIC DRILLING

#### ✓ SUB-TASKS

1. Demonstrate good understanding SONIC drilling requirements.
  2. Demonstrate and understand frequency requirements based on ground conditions.
  3. Demonstrate the ability core/case.
  4. Demonstrate controlled rate of penetration in relation to ground conditions and circulation (clearing of cuttings).
  5. Demonstrate the working mud system and flocculation of cuttings.
  6. Ability to add and remove drill steel.
  7. Demonstrate and understand the testing requirements.
  8. Demonstrate and understand the installation requirements.
  9. Demonstrate cement/grouting of the borehole at completion.
- 

#### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- No additional references or examples.

# DRILLER

## Area of Competency 28: Perform Auger Drilling Operations



## TASK 28.1

# UNDERSTAND AND DEMONSTRATE AUGER DRILL KNOWLEDGE

### ✓ SUB-TASKS

1. Train and become authorized for proper use and operation of diamond drill.
2. Prepare drill site.
3. Set up drill.
4. Install safety equipment.
5. Conduct pre-operational checks.
6. Start drill.
7. Shut down drill.
8. Maintain drill.
9. Refuel drill.
10. Tear down drill.
11. Environment considerations/protection.

### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- Train and become authorized for proper use and operation of drill.
  - Types of diamond drills include self-propelled, bar-mounted, skid-mounted, rail.
  - Drills may be powered by air, electricity or diesel.
- Prepare drill site.
  - Site must be of adequate size to accommodate equipment and free of obstructions and hazards.
  - Determine need to use cribbing to level drill.
  - Follow surface site plan to allocate space for ancillary equipment, fuel storage, garbage disposal.
  - Check underground site for services (air, water, power, ventilation), ground support, ground condition, hazards (missed holes, bootlegs, lifters).
  - Extend underground services.
- Set up drill.
  - Position drill as per drill layout.
  - Crib drill with timbers, as required.
  - Install underground staging as required.
  - Set up drill on surface following manufacturers specifications (assemble or extend mast, affix associated components such as rod racks, basket, cables, lanyards, fall arrest system, lights, stiff leg, guy wires as required, raise mast/tower to correct inclination, anchor and secure stiff legs and guy wires to appropriate/designated location (drill shack).
  - Set up drill underground as per drill layout (front sight and back sight, anchor drill).
  - Set up water supply system (set up pump and lay out water hoses, bring water supply to drill tub and/or cooler system, connect water swivel to water swivel hose and pressure pump).
- Install safety equipment.
  - Includes: fire extinguishers in drill shack and pump shack, seasonal firefighting equipment, emergency response equipment, spill kits, guard rails, communication devices, fall protection, hazardous gas tester, approved first aid kit, adequate lighting for night work.
  - Ensure all safety devices are in place, secure and in good operating condition (spark arrester).
- Conduct pre-operational checks.
  - Use pre-op checklist and check condition of components (mechanical and rotating components, fluid levels (Fuel, oil, hydraulic fluid), hydraulic and fuel fittings, guarding, safety equipment, work environment (lighting, temperature), environmental checks (fluid leaks - hydraulic and fuel, air quality, exhaust leaks).
- Start drill.
  - Put controls into neutral position.
  - Follow manufacturer's specifications for start-up.
  - Turn on power source.
  - Monitor gauges to ensure equipment is operating properly within manufacturer's parameters (fluid levels, water pressure, system hydraulic pressures).
  - Check drill functions on equipment (drill rod threading, drill head rotation, chuck, foot clamp, pump, wireline winch).
  - Listen for unusual sounds.
  - Report deficiencies to supervisor.
  - Monitor fuel levels during operation.
- Shut Down.
  - Place controls in neutral.
  - Turn off water going to the hole, power source on panel, air.
  - Reduce to idle speed.
  - Conduct post-operational check with checklist (guards, fluid levels).
- Maintain drill.
  - Inspect bit face for signs of damage and wear (burning, ringing, breakage) change bit if necessary.
  - Check core barrel assembly and change core barrel, if necessary.
  - Check gauge of reaming shell.
  - Replace or adjust components.
  - Lubricate equipment according to manufacturer's specifications.
- Refuel.
  - Monitor drill fuel levels during operation.
- Tear down diamond drill.
  - Remove safety features.
  - Lower mast.
  - Remove mast accessories.
  - Remove anchors.
  - Disassemble components (disconnect hoses).
  - Prepare and secure loads for moving.
  - Use approved fuel pumping equipment.
  - Inspect terrain and remediate site prior to leaving.
  - Ensure no hazards are left behind.
- Environment considerations/protection.
  - Manage fuel and other hazardous materials.
  - Use approved fuel pumping equipment.
  - Inspect terrain and remediate site prior to leaving.
  - Ensure no hazards are left behind.



## TASK 28.2

### UNDERSTAND AUGER TOOLING AND PREPARATION

✓ **SUB-TASKS**

1. Understand different auger toolings and preparations.
2. Understand drive assemblies.
3. Understand different types of pins and bolts.

✓ **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Understand different auger toolings and preparations.
  - Including but not limited to; solid stem, hollow stem, bit types.



## TASK 28.3

### DEMONSTRATE AND UNDERSTAND DOWN HOLE TROUBLESHOOTING

✓ **SUB-TASKS**

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Understand borehole collapsing.</li> <li>2. Loss of circulating when HS Auger drilling.</li> </ol> | <ol style="list-style-type: none"> <li>3. Apply or correct the deviation.</li> <li>4. Switch from SS to HS due to BH collapse.</li> </ol> |
|--|---|

✓ **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Apply or correct the deviation.
  - Install retrievable wedge, steep wedge, steerable tools.



## TASK 28.4

### UNDERSTAND BASIC GEOLOGY

✓ **SUB-TASK**

1. Explain different OVB ground types.

**REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Explain different OVB ground types.
  - Including but not limited to; clays, silts, sands, gravels, till, consolidated, etc.



## TASK 28.5

### OPERATE AUGER DRILLING

#### ✓ SUB-TASKS

1. Demonstrate SS Auger BH advancement.
  2. Demonstrate SS Auger sample recovery.
  3. Demonstrate HS Auger BH advancement and circulations.
  4. Demonstrate efficient order of operations.
  5. Add and remove drill steel.
  6. Demonstrate and understand testing requirements.
  7. Demonstrate and understand installation requirements.
  8. Demonstrate cement/grouting of the borehole at completion.
  9. Explain and demonstrate how to control heave.
- 

#### ✓ REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE

- No additional references or examples.

# DRILLER

## Area of Competency 30: Operate Processing Equipment

**THE FOLLOWING PRINCIPLES APPLY TO ALL TASKS UNDER THIS AREA OF COMPETENCY**

- ✓ Adhere to Area of Competency 6 – Energy Sources.
- ✓ Adhere to Area of Competency 10 – Equipment Knowledge.
- ✓ Ensure proper guards are in place.

 **TASK 30.20**  
**INSPECT AND MAINTAIN HOSES**

✓ **SUB-TASKS**

1. Describe hoses.
2. Use hoses.
3. Repair hoses.

✓ **REFERENCE/EXAMPLES OF ABILITIES AND KNOWLEDGE**

- Describe hoses.
  - Water hose: commonly used to supply drill with water or wash the headings or rock face, usually made of rubber, come in various sizes, usually 1 inch diameter.
  - Air hose: used for low/high air pressure applications, e.g., pneumatic tools, usually made of rubberized material.
- Use hoses.
  - Inspect hoses to ensure they are not damaged.
  - Turn on air or water slowly to detect any unnoticed damage.
  - Do not let hose become a tripping hazard.
  - Protect hoses from falling muck.
- Repair hoses.
  - Air hoses: ensure clear of muck, debris or water before connecting to a piece of equipment, use whip check when attaching air hoses to diamond drills.
  - Water hoses: be aware of sudden surges of pressure in water hoses caused by air locks.
  - Use correct fitting for hoses (joiners, ends).
  - Use clamps to secure hose to fitting (select correct size, use correct number of clamps for size of hose, punch to ensure connection, be careful not to cut hose).
  - Discard damaged hoses.