



Australian Government

Department of Education, Employment and Workplace Relations

RIINHB315A Conduct top-hole hammer drilling

Release: 1

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Modification History

Not applicable.

Unit Descriptor

This unit covers the conduct of top-hole hammer drilling in the drilling industry. It includes planning and preparing for top-hole hammer drilling, operating top-hole hammer drilling, using drilling fluids, maintaining equipment, and responding to problems. Licensing, legislative, regulatory and certification requirements that apply to this unit can vary between states, territories, and industry sectors. Relevant information must be sourced prior to application of the unit.

Application of the Unit

This unit is appropriate for those working in an operational role at worksites within:

- Drilling

Licensing/Regulatory Information

Refer to Unit Descriptor.

Pre-Requisites

Not applicable.

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Plan and prepare for top-hole hammer drilling	1.1. Access, interpret and apply compliance documentation relevant to the work activity 1.2. Obtain, confirm and apply work instructions for the allocated task 1.3. Identify, manage and report all potential hazards 1.4. Resolve coordination requirements with others at the site prior to commencing and during work activities 1.5. Select tools and equipment to carry out tasks consistent with driller's duties and the requirements of the job, check for serviceability and rectify or report any faults 1.6. Check restraining devices on all pressure hoses 1.7. Fit/replace restraining devices on pressure hoses as required 1.8. Raise alarm/report as required
2. Operate top hole hammer drill	2.1. Select appropriate rod type, thread form and drill string components for job 2.2. Measure and select appropriate bit for the job 2.3. Collar hole 2.4. Use rod handling equipment safely and correctly 2.5. Add/break out and remove drill rods/pipes and top hole equipment 2.6. Adjust/feed/rotate drill at right rate for optimum penetration 2.7. Adjust impact pressure and rate to match ground conditions 2.8. Adjust air pressure to achieve required hole clearance 2.9. Measure line string and calculate depth of hole
3. Use drilling fluids as required	3.1. Identify hole conditions requiring the use of dust control fluids 3.2. Select suitable ingredients/fluids 3.3. Prepare/monitor the preparation of required

	fluids 3.4. Use dust control fluids to achieve required result
4. Maintain equipment	4.1. Monitor wear 4.2. Check all equipment and hoses 4.3. Replace shanks as required 4.4. Replace/adjust and report damaged/worn parts as required 4.5. Undertake bit sharpening as required 4.6. Grease drifter as required
5. Respond to problems	5.1. Monitor operation and chips/ <i>sample</i> /air return 5.2. Identify possible problems in equipment or process 5.3. Clear blockages 5.4. Determine other problems and <i>maintenance tasks</i> needing action 5.5. Determine possible fault causes 5.6. Rectify problem using appropriate solution within area of responsibility 5.7. Follow through items initiated until final resolution has occurred 5.8. Report problems outside area of responsibility to designated person

Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

Required skills

Specific skills are required to achieve the Performance Criteria of this unit, particularly for its application in the various circumstances in which this unit may be used. This includes the ability to carry out the following, as required to conduct top-hole hammer drilling:

- apply legislative, organisation and site requirements and procedures for conducting top-hole hammer drilling
- identify various thread types on the equipment at site and the application of prescribed torque
- identify worn drill pipe and damaged threads
- identify and measure various bits in use
- correctly use the various rod/pipe handling equipment on site
- correctly and competently add/remove rods/pipe from the string
- correctly apply rotation speed and weight on the bit to maintain optimum performance
- correctly measure line string components and calculate hole depth
- utilise the correct combination of hydraulic oil flow volume and pressure to maintain productivity
- collar holes
- ensure that samples are correctly collected and handled
- ensure that all string components are correctly maintained
- correctly measure bits and related components to ensure compatibility
- ensure that bit sharpening equipment, used to sharpen TC bits are used correctly and safely and that bits are sharpened to correct tolerances
- correctly select various bit types for differing ground conditions
- monitor sample quality and correctly interpret changes
- use prescribed techniques to safely clear sample delivery hose blockages
- accept responsibility for the correct installation and maintenance of restraining devices to pressure and sample delivery hoses
- communicate the hazards of cuttings in the return air stream to all crew members
- ensure that drill pipe is inspected regularly and wear rates monitored
- ensure that threads are inspected and maintained as required

Required knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly for its application in the various circumstances in which this unit may be used. This includes knowledge of the following, as required to conduct top-hole hammer drilling:

- critical need to match like threads with like threads on all tubular components and

make up torque requirements

- parameters relating to wear of drill pipe and integrity of threads
- function of hole collaring
- methods required to limit the contamination of samples
- theory behind TC bit sharpening
- bit selection for different types of drilling and different ground conditions
- problems related to inaccurate measurement of bits and other related components
- importance of monitoring sample quantity
- role that blockages play in affecting sample quality
- methods commonly used to clear down hole blockages in air drilled holes and the hazards associated with clearing blockages
- methods used to clear a blockage in a sample delivery hose and the hazards associated with clearing blockages
- critical need for restraining devices to be fitted to all pressure delivery hoses and sample delivery hoses, the devices available and their methods of attachment
- dangers of drilled samples being returned to the surface at high velocity in air drilling operations and the parameters involved
- importance of checking gauges and monitoring pressures, flow rates and temperatures

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the performance criteria, required skills and knowledge and the range statement of this unit and include evidence of the following:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions for top-hole hammer drilling • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of top-hole hammer drilling • working with others to undertake and complete the conduct of top-hole hammer drilling that meets all of the required outcomes • consistent timely completion of top-hole hammer drilling that safely, effectively and efficiently meets the required outcomes
Context of and specific resources for assessment	<ul style="list-style-type: none"> • This unit must be assessed in the context of the work environment. Where personal safety or environmental damage are limiting factors, assessment may occur in a simulated environment provided it is realistic and sufficiently rigorous to cover all aspects of workplace performance, including task skills, task management skills, contingency management skills and job role environment skills. • Assessment of this competency requires typical resources normally used in a resources and infrastructure sector environment. Selection and use of resources for particular worksites may differ due to the site circumstances. • The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job. • Customisation of assessment and delivery

	<p>environment to sensitively accommodate cultural diversity.</p> <ul style="list-style-type: none"> • Aboriginal people and other people from a non English speaking background may have second language issues. • Where applicable, physical resources should include equipment modified for people with disabilities. Access must be provided to appropriate learning and/or assessment support when required.
Method of assessment	<p>This unit may be assessed in a holistic way with other units of competency. The assessment strategy for this unit must verify required knowledge and skill and practical application using more than one of the following assessment methods:</p> <ul style="list-style-type: none"> • written and/or oral assessment of the candidate's required knowledge • observed, documented and/or first hand testimonial evidence of the candidate's: <ul style="list-style-type: none"> • implementation of appropriate requirement, procedures and techniques for the safe, effective and efficient achievement of required outcomes • consistent achievement of required outcomes • first hand testimonial evidence of the candidate's: <ul style="list-style-type: none"> • working with others to undertake and complete the conduct of top-hole hammer drilling
Guidance information for assessment	<p>Consult the SkillsDMC User Guide for further information on assessment including access and equity issues.</p>

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Relevant compliance documentation may include:	<ul style="list-style-type: none"> • legislative, organisational and site requirements and procedures • manufacturer's guidelines and specifications • Australian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Work instructions may come from briefings, handovers, plans and work orders and may be written or verbal, formal or informal and may include:	<ul style="list-style-type: none"> • nature and scope of tasks • specifications • quality of finished works • achieved targets • operational conditions • obtaining of required permits • site layout • out of bounds areas • worksite inspection requirements • lighting conditions • plant of equipment defects • coordination requirements or issues • contamination control requirements • environmental control requirements • barricade and signage requirements
Hazards may include:	<ul style="list-style-type: none"> • working in proximity to drilling rig • injuries to fingers, hands and back • incorrect speed of operation • inadequate maintenance • heat, dust, fatigue, dehydration • high pressure air discharge • high pressure hydraulic fluid discharge • leakage of couplings • flailing couplings • flailing components

	<ul style="list-style-type: none"> • fire • rock fall • void ground
Coordination requirements may include:	<ul style="list-style-type: none"> • other equipment operators • maintenance personnel • supervisors • site personnel
Tools and equipment may include:	<ul style="list-style-type: none"> • drill rods and drill pipe including: <ul style="list-style-type: none"> • shanks • API threads • BECO threads • thread protectors • drill bits including: <ul style="list-style-type: none"> • cross bits, button bits and retrac bits • DTH hammer concave, convex and flat face bits • rod and casing handling equipment: <ul style="list-style-type: none"> • manual handling • mechanised rod handlers • hydraulic pipe/rod/clamps • hydraulic pipe/rod/spinner • make and break: <ul style="list-style-type: none"> • stillsons • hydraulic pipe wrenches • rod spinners • hydraulic make/break devices • make up torque requirements • bit break out plates
Driller's duties may include:	<ul style="list-style-type: none"> • using correct rod to hole diameters • selecting best bit configuration for ground and hole conditions • maintaining correct rotation speed and weight on bit for optimum penetration • calculating line string and hole depth • using correct combination of air volume and pressure to suit drilling conditions • monitoring collection and bagging of samples • ensuring all equipment is kept clean and stored correctly • ensuring principles of good housekeeping are followed

	<ul style="list-style-type: none">• measuring bit diameters
Restraining devices may include:	<ul style="list-style-type: none">• internal/external whip checks• full 'sock' whip checks• anchor points• hose fittings
Fluids may include:	<ul style="list-style-type: none">• dust control additives• water
Sample and sampling tasks may include:	<ul style="list-style-type: none">• DTH samples
Maintenance tasks may include:	<ul style="list-style-type: none">• sharpening button bits, cross bits• using grinders, bit sharpening machines• line string components (e.g. drill rods, subs, stabilisers, couplings, air swivels)• drill bits

Unit Sector(s)

Drilling (General)

Competency field

Refer to Unit Sector(s).

Co-requisite units

Not applicable.