



Australian Government

Department of Education, Employment and Workplace Relations

RIINHB311A Conduct mud rotary drilling

Release: 1

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Modification History

Not applicable.

Unit Descriptor

This unit covers the conduct of mud rotary drilling in resources and infrastructure industries. It includes planning and preparing for conducting of mud rotary drilling; operating mud rotary drills and fluid systems; maintaining equipment; and responding to problems.

Application of the Unit

Rotary mud drilling is used for environmental, geotechnical, mineral exploration and waterwell drilling. This unit is appropriate for those working in a driller roles, at worksites within:

- Civil construction
- Coal mining
- Drilling
- Extractive industries
- Metalliferous mining

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 conducting of mud rotary 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
2. Operate mud rotary drill	2.1. Make up appropriate drill string. 2.2. Use bits, rods and casings 2.3. Seal hole collar 2.4. Feed and rotate drill at right rate for the formation 2.5. Interpret flow from drill to determine conditions at bit 2.6. Adjust flow rates to give desired results 2.7. Check drill bits and string components for wear, gauge, dents and damaged threads 2.8. Use casing, grout screens to correct zones or levels as required
3. Operate fluid system	3.1. Determine required up hole velocity and the related fluid properties and feed rate 3.2. Recognise different types of strata 3.3. Design and adjust mud system to suit geological conditions and changes to conditions which might be expected during the drilling 3.4. Ensure there is an adequate supply of water to the site for mud requirements and circulation loss zones 3.5. Make up appropriate formulation using different types of mud and chemicals 3.6. Construct mud pits and systems to suit hole dimensions and site storage requirements 3.7. Monitor, check and adjust flow rate and properties 3.8. Keep fluid clean and chlorinate/sanitise lost circulation if required

	3.9. Check and adjust fluid reticulation systems 3.10. Dispose of drill fluids correctly
4. Maintain equipment	4.1. Monitor wear and recognise symptoms of malfunction 4.2. Check all equipment and hoses 4.3. Monitor all seals and connections 4.4. Replace, adjust and report items needing attention. 4.5. Service gear and adjust glands where required 4.6. Service rig regularly following service sheets for daily, weekly and monthly lubrication and checking 4.7. Check oil drops for signs of repairs needed 4.8. Maintain inspection and/or service records
5. Respond to problems	5.1. Identify possible operational problems in equipment, process or mud 5.2. Determine problems needing action 5.3. Determine possible fault causes 5.4. Rectify problem using appropriate solution(s) within area of responsibility 5.5. Follow through items initiated until final resolution has occurred 5.6. 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 in this unit, particularly for the application in the various circumstances in which this unit may be applied. This includes the ability to carry out the following as required to conduct mud rotary drilling:

- apply legislative, organisation and site requirements and procedures for conducting of mud rotary drilling
- perform routine checks and basic maintenance of mud and water delivery pumps
- apply mechanical hand skills
- apply mud mixing and conditioning skills
- apply plant operational skills
- respond to changes in ground conditions
- apply sample identification and sampling skills
- apply hazardous substances handling requirements and procedures
- apply people skills for dealing with clients, co-workers and management
- apply recording and reporting skills
- interpret materials safety data sheets (MSDS)
- apply heavy vehicle driving skills in all conditions

Required knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly its application in a variety of circumstances in which the unit may be used. This includes knowledge of the following, as required to conduct mud rotary drilling:

- rotary drilling safety requirements and procedures
- personal protection requirements
- First Aid requirements and procedures
- good housekeeping requirements and procedures
- types of mud and water delivery pumps and their applications
- methods for the calculation of lag time for discrete formation samples
- basic geology
- safe work procedures for pump unit repairs, maintenance and servicing

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	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: • knowledge of the requirements, procedures and instructions for the conducting of mud rotary drilling • implementation of requirements, procedures and techniques for the safe, effective and efficient completion of mud rotary drilling tasks • working with others to undertake and complete mud rotary drilling tasks that meet all of the required outcomes • consistent timely completion of the conducting of mud rotary drilling that safely, effectively and efficiently meets the required outcomes
Context of and specific resources for assessment	• 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. • 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 environment to sensitively accommodate cultural diversity. • Aboriginal people and other people from a non English speaking background may have second

	language issues. • Assessment of this competency requires typical resources normally used in the work environment. Selection and use of resources for particular worksites may differ due to site circumstances. • 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	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: • written and/or oral assessment of the candidate's required knowledge • observed, documented and/or first hand testimonial evidence of the candidate's: • implementation of appropriate requirement, procedures and techniques for the safe, effective and efficient achievement of required outcomes • consistently achieving the required outcomes • first hand testimonial evidence of the candidate's: • working with others to undertake and complete mud rotary drilling tasks
Guidance information for assessment	Consult the SkillsDMC User Guide for further information on assessment including access and equity issues.

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:	• 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: • nature and scope of tasks • specifications • quality of finished works • achievement targets • operational conditions • obtaining of permits required • site layout • out of bounds areas • worksite inspection requirements • lighting conditions • plant or equipment defects • hazards and potential hazards • coordination requirements or issues • contamination control requirements • environmental control requirements • barricade and signage requirements
Hazards may include:	• release of gases from formation or samples obtained • spread of contaminants as a result of drilling or cleaning processes • change in the chemistry of contaminants as a result of drilling and recovery of the samples

	• working in proximity to drilling rig • use of high pressure air for drilling operations • entanglement in rotating pipes • string makeup and breakout hazards • drilling equipment and down-hole tools will depend on the air drilling method being used
Coordination requirements may include	• drill team members • other equipment operators • maintenance personnel • supervisors • worksite personnel
Chemical includes:	• fluid loss control agents • dispersants • surfactants • weighing agents (barium sulphate or salts) • pH control agents • gypsum based setting agents • other cement grout additives for quick setting • agents for treating cement contamination • flocculation products • potassium chloride • lost circulation materials (granular polymers, cottonseed hulls, mica flakes, shredded organic fibre, micro-cells and short polysynthetic rope fibres) • A&B foam (for sealing collars) • chlorination products
Drill fluids may include:	• water • viscosifying polymer muds with or without use of sodium bentonite • blended polymer muds • API bentonite muds • high yielding bentonites muds • organic polymer muds • polyanionic cellulosic polymer muds • modified natural polymer muds • liquid anionic polymer muds
Equipment includes:	• rig, water trucks, service trucks, air compressor • hand tools such as breakout tongs and stillsons • collars • stabilisers • drill pipe

	• casing • drill bits such as drag, tricone, tungsten carbide, hammers, strata, diamond, reamers
Operational problems may include:	• circulation loss zones • machine breakdowns • equipment failure • drill bit failure/breakage • deterioration in the mud condition

Unit Sector(s)

Drilling (General)

Competency field

Refer to Unit Sector(s).

Co-requisite units

Not applicable.