Australian Government

RIINHB311X Conduct mud rotary drilling

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Release: 1

RIINHB311X Conduct mud rotary drilling

Modification History

Release	Comments
1	This unit of competency was first released in RII Resources and Infrastructure Industry Training Package Release 13.0.

Application

This unit describes the skills and knowledge required to conduct mud rotary drilling. It includes making up drill fluid, installation and monitoring of equipment and maintenance procedures.

It applies to those working in operational roles. They generally perform tasks involving a broad range of skilled applications in a wide variety of contexts, which may involve some discretion and judgement in selecting equipment, services and contingency measures.

Licensing/Regulatory Information

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite unit(s)

No pre-requisite units

Competency field(s)

N/A

Unit sector(s)

Drilling

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Elements and Performance Criteria

Element	Performance criteria
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Plan and prepare for mud rotary drilling	1.1 Obtain and confirm work requirements, hole plan and permit requirements 1.2 Access and apply mud rotary drilling documentation and confirm work activity is compliant 1.3 Identify and address potential risks, hazards and environmental issues and implement control measures for the drilling context according to site procedures 1.4 Confirm, environmental controls, emergency response procedures and, exclusion zones according to site requirements 1.5 Identify and confirm equipment meets the requirement to complete the hole to plan specification 1.6 Select and wear personal protective equipment required for work activities 1.7 Confirm drilling crew roles, competencies, responsibilities and communication requirements
2. Operate mud rotary drill in line with established requirements	2.1 Carry out prestart and start-up procedures according to manufacturer specifications and workplace procedures 2.2 Set up and position drill string, bits, rods and casings required to complete work activity according to site layout plan 2.3 Make up drill fluid according to work requirements 2.4 Monitor drilling response, loads, vibration, fluid flow, operating pressure, returns, cuttings, fluid losses or gains, fluid condition and other indicators of downhole conditions 2.5 Identify changing conditions or faults, determine possible causes and action required, and rectify or report within scope of own responsibility and according to workplace procedures 2.6 Operate equipment and adjust parameters to suit conditions of the hole 2.7 Construct top hole according to hole plan and install surface or conductor casing

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	2.8 Drill to hole depth and monitor fluids, hole returns and cuttings 2.9 Determine end of hole requirements as per client instructions
3. Complete post-drilling operation processes	3.1 Cap and secure the hole and site as required 3.2 Complete site housekeeping activities according to workplace requirements 3.3 Complete and file or submit documentation for drilling operations and equipment according to workplace procedures

Range of conditions

N/A

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Assessment Requirements for RIINHB311X Conduct mud rotary drilling

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements and performance criteria of this unit, including evidence of the ability to:

- conduct mud rotary drilling to complete at least two holes to target depth, in at least two different formation types, including for each hole:
    - developing a work plan for a hole from work requirements and site documentation that addresses safety, environmental, permit and emergency requirements and the equipment, materials and mud design needed to reach target depth
    - conducting pre-start and shutdown checks, and making up and checking the drill string and downhole assembly to confirm it is fit for the hole
    - making up, testing and adjusting the mud system to suit the ground conditions and requirements of the hole
    - constructing the top hole and installing surface or conductor casing, and any other casing, seals, screens and grout required by the hole plan
    - drilling to target depth while monitoring fluids, returns, cuttings and up hole velocity as indicators of downhole conditions, and adjusting operating parameters, including feed and rotation, to suit changing conditions
    - maintaining equipment and disposing of drill fluids according to environmental requirements
    - completing end of hole activities, including capping and securing the hole and site, according to the drilling program and site requirements
    - completing drilling records and reports

During the above, the candidate must:

- identify hazards, risks and environmental issues, including hazardous materials and contaminants, and apply control measures, personal protective equipment and safety data sheet requirements according to site procedures
- identify, and rectify or report, at least one operational problem or change in ground conditions encountered during drilling
- communicate with clients, co-workers and management to clarify instructions, confirm crew roles and coordinate work activities.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements and performance criteria of this unit, including knowledge of:

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- key policies, procedures and established requirements for conducting mud rotary drilling, including those for:
    - workplace health and safety
    - emergencies
    - environmental practice
    - set up and installation of drilling equipment and materials
    - processes for mud mixing and conditioning
    - maintenance and repair
    - hazard identification, risk assessment and control measures
    - permits, approvals and hole plan requirements
    - selection and use of personal protective equipment
    - end of hole completion, capping and securing the hole and site, and site housekeeping
    - documentation, records and reporting requirements
- basic geological data, and how anticipated formations inform mud design and bit selection
- lag time and up hole velocity, including:
    - how pump output, hole diameter and rod diameter determine up hole velocity
    - effects of insufficient velocity on cuttings removal, sample depth accuracy and hole condition
- key factors affecting work activities described in performance evidence above, including:
    - types of mud and water delivery pumps and their applications
    - types of formations and their effects on drilling fluids, hole stability and penetration rate
    - types of fluids, including their properties and functions, and the reasons density, viscosity, pH and filtration are controlled
    - types of bits, rods and casings and their functions, and how ground conditions determine bit selection
- reasons drilling fluid maintains hole stability, and the consequences of a loss of circulation
- causes, indicators and control measures for:
    - lost circulation
    - swelling shales
    - hole collapse

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- indicators of changing ground conditions observable at the surface, and what each shows about conditions at the bit, including changes in:
    - penetration rate
    - pump pressure
    - fluid return volume
    - cuttings character
- consequences of continuing to drill without responding to indicators of changing conditions
- reasons casing, screens and grout are installed to specified zones, and the consequences of inadequate zonal isolation for aquifer protection
- drilling crew roles, competencies and responsibilities, and the communication requirements that apply to drilling operations.

Assessment Conditions

Mandatory conditions for assessment of this unit are stipulated below. The assessment must:

- include access to:
    - personal protective equipment
    - equipment required to conduct mud rotary drilling
    - workplace documentation such as, drill plans, site plans and procedures, manufacturer instructions and safety data sheets
- be conducted in a safe environment
- be assessed in the context of this sector's work environment
- be assessed in compliance with relevant legislation/regulation and using policies, procedures and processes directly related to the industry sector for which it is being assessed
- confirm consistent performance can be applied in a range of relevant workplace circumstances.

Where personal safety or environmental damage are limiting factors, assessment may occur in a simulated work environment* provided it is realistic and sufficiently rigorous to cover all aspects of this sector's workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills.

*Guidance on simulated environments has been stipulated in the RII Companion Volume Implementation Guide.

Industry Experts

An industry expert engaged by an RTO to wholly or partially conduct assessment, independently or together with another assessor, or be involved in an assessment judgement,

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must also satisfy the assessor requirements in applicable vocational education and training legislation, frameworks and/or standards.

Assessors and industry experts delivering training in the drilling industry sector must also have a minimum of three (3) years industry experience, directly relevant to the training and assessment being provided.

Mandatory Workplace Requirements

Assessment of performance evidence may be in a workplace setting or an environment that accurately represents a real workplace.

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Unit Mapping Information

Previous Code and Title	Equivalence	Comments
RIINHB311E Conduct mud rotary drilling	Equivalent	Updates to application, elements and performance criteria, performance and knowledge evidence, and assessment conditions

Links

Companion volumes, including implementation guides, are found on the national training register - https://training.gov.au/training/details/RII.

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