Australian Government

RIINHB329X Conduct sonic drilling

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Release: 1

RIINHB329X Conduct sonic 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 sonic drilling. It prepares learners to drill using sonic methods, including casing off unconsolidated formations and retrieving core.

It applies to those working in driller 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 to conduct sonic drilling	1.1 Obtain, interpret and confirm work requirements 1.2 Access, interpret and apply documentation required to conduct sonic drilling and confirm work activity is compliant 1.3 Identify and minimise environmental issues and potential hazards, maintain housekeeping and assess and address risks within scope of own role and according to workplace procedures 1.4 Select and wear personal protective equipment required for work activity 1.5 Communicate with other personnel at site according to work requirements and confirm briefings and handover details are communicated and received 1.6 Determine ancillary equipment required and set up according to site plan 1.7 Determine drilling and casing diameters required, as determined by sampling requirements, instrumentation install and client specification 1.8 Access, interpret and apply documentation required to determine casing diameter to match core barrel diameter 1.9 Carry out prestart and start-up procedures according to manufacturer specifications and site requirements 1.10 Obtain and interpret emergency procedures and identify steps required in case of fires, accidents and other emergencies according to workplace procedures
2. Drilling with sonic core barrel	2.1 Select core barrel and bit, adapters and threads and inspect for damage and wear according to manufacturer specifications and ground conditions 2.2 Make up core barrel with bit and confirm bit outside diameter is matched to pass through

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	casing shoe inside diameter according to manufacturer specifications 2.3 Fit core barrel onto drill string according to manufacturer specifications 2.4 Commence sonic drilling, adjusting feed, rotation and oscillation to suit ground formation according to manufacturer specifications 2.5 Disengage oscillation at end of run before lifting core barrel off bottom of hole according to manufacturer specifications 2.6 Sit core barrel on bottom of hole and detach drill head according to manufacturer specifications
3. Run casing over core barrel	3.1 Fit casing adapter or deuce to drill head, reverse rotation, according to manufacturer specifications 3.2 Add casing to drill head according to manufacturer specifications 3.3 Make up casing length with casing shoe, and check for damage or wear of casing, shoe, adapters and threads, according to manufacturer specifications 3.4 Ream casing over drill string, adjusting feed, rotation and oscillation to suit formation 3.5 Mix and use drill fluids to suit ground conditions according to manufacturer specifications 3.6 Break casing joint, leave casing on bottom of hole and remove casing adapter from drill head according to manufacturer specifications
4. Retrieve core sample	4.1 Make up drill string to rotation head according to manufacturer specifications 4.2 Trip rods and core barrel out of hole according to manufacturer specifications 4.3 Prepare work area to retrieve core according to workplace procedures 4.4 Vibe core from core barrel into polybag or tray according to workplace procedures 4.5 Trip core barrel and rods back down hole according to manufacturer specifications
5. Trip casing out of completed hole	5.1 Use vibe to extract casing from ground according to manufacturer specifications

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	5.2 Trip casing out of hole according to manufacturer specifications
6. Conduct inspections of sonic head, spindle, fixtures and fixings, drill rods and casing	6.1 Conduct regular inspections of sonic head, including bolts and mounting points, for fatigue caused by sonic vibrations according to manufacturer specifications 6.2 Conduct regular inspections of spindle for fatigue caused by sonic vibrations according to manufacturer specifications 6.3 Inspect drill rods, core barrels, bits, casing, casing shoes and casing adapters for fatigue caused by sonic vibration according to manufacturer specifications 6.4 Use torque wrench to check tension of spindle and swivel bolts according to manufacturer specifications

Range of conditions

N/A

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Assessment Requirements for RIINHB329X Conduct sonic 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 sonic drilling on at least two occasions, including:
    - sonic drilling through, and casing off, unconsolidated formation
    - retrieving and bagging sample from sonic core barrel according to workplace procedures
    - inspecting drill head and associated equipment for signs of fatigue.

During the above, the candidate must:

- locate and apply legislation, documentation, policies and procedures required to conduct sonic drilling
- implement the requirements, procedures and techniques for conducting sonic drilling, including:
    - keeping work area clean and maintain housekeeping according to workplace procedures
    - selecting and wearing required protective clothing and equipment
    - conducting pre-operational checks
    - reporting immediately any malfunction or equipment failure
    - inspection of sonic head assembly for damage caused by sonic vibration
    - adjusting feed, rotation and oscillation in response to changes in penetration rate, formation or core recovery, and confirming required core recovery is maintained or restored
    - completing drilling records for each hole, including ground conditions encountered, drilling parameters applied and any changes made to those parameters
- work with others to assist sonic drilling that meets required outcomes, including:
    - organising work activities to meet all task requirements
    - communicating with others to receive and clarify work instructions.

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:

- key policies, procedures and established requirements for conducting sonic drilling, including those for:

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  - work health and safety
  - emergencies
  - identifying hazards relevant to sonic drilling
  - environmental considerations
  - housekeeping
- compatibility of different core barrel and bit sizes to differing casing sizes, and the consequences of an incompatible combination for casing advancement and core recovery
- factors determining bit selection, including ground conditions and task outcomes, and consequences of selecting a bit unsuited to the ground being drilled
- reasons bolt torques are checked, how sonic vibration causes fatigue in the drill head, spindle, rods and casing, and the consequences of undetected fatigue
- principles of sonic drilling, including how resonant vibration is generated in the drill string and how it advances the bit through formation
- relationship between feed, rotation and oscillation frequency, and how each is adjusted to suit the formation being drilled
- reasons oscillation is disengaged at the end of a run before lifting the core barrel off the bottom of the hole, and the consequences of failing to do so
- common formation types encountered in sonic drilling and how each affects penetration rate, core recovery and casing advancement
- indicators of changing ground conditions observable at the surface, including changes in penetration rate, oscillation response, torque and the condition of recovered core, and what each indicates about conditions at the bit
- reasons casing is advanced over the drill string, and the consequences of inadequate casing support for hole stability and cross-contamination between intervals
- methods for extracting casing on completion of a hole, conditions that make extraction difficult, and risks arising during extraction including stuck casing, hole collapse and stored energy in the string
- functions of drilling fluids in sonic drilling, and how ground and water conditions determine their selection
- reasons a continuous core is produced, what is required for it to represent the interval drilled, and how sample disturbance and heating during drilling affect its validity
- effect of ground water on core behaviour, sample quality and casing advancement
- purpose of drilling records, the ground conditions and drilling parameters they capture, and how that information is used once a hole is complete
- requirements for reporting damage, fatigue, malfunction or equipment failure, and the consequences of a defect going unreported.

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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 sonic drilling
    - work procedures for sample retrieval and presentation
    - 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, 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
RIINHB329 Conduct sonic drilling	Equivalent	Updates to 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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