



Australian Government

RIINHB325D Construct and complete single aquifer production bores

Release: 2

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Modification History

Release	Comment
1	This unit replaces RIINHB325A Construct and complete single aquifer production bores.
2	Performance Criteria numbering corrected. Required frequency and volume of evidence amended in Performance evidence. Substantial amendments made in Assessment Conditions field, including: references to Industry Sectors, assessor and subject matter expert experience requirements, how assessment should be conducted and what it should confirm.

Application

This unit describes a participant's skills and knowledge required to construct and complete single aquifer production bores in Drilling.

This unit is appropriate for those working in operational roles.

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 this unit

Unit Sector

Drilling

Elements and Performance Criteria

1. Plan and prepare for the construction of single aquifer production bores	1.1 Access, interpret and apply single aquifer production bore construction documentation and ensure the work activity is compliant 1.2 Obtain, read, interpret, clarify and confirm work requirements 1.3 Identify and address potential risks, hazards and environmental issues and implement control measures
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	1.4 Select and wear personal protective equipment appropriate for work activities 1.5 Discuss scope of work with client and give technical advice, cost structure, workmanship warranty, quantity and quality of materials, construction standards and methods to be used and gain general agreement on drilling plan 1.6 Obtain or sight any licences or permits required under the relevant state/territory legislation or regulation 1.7 Communicate and coordinate activities with others throughout the work activity 1.8 Obtain and interpret emergency procedures, and be prepared for fire/accident/emergency 1.9 Provide detailed strata logs, pump and development test results conducted during bore development and water and strata samples to the appropriate authorities 1.10 Complete all requirements for bore completion reports, decommissioning or abandonment and send to regulatory authorities within the time specified on bore licence
2. Design production bores for single aquifer systems	2.1 Determine most appropriate construction methods from the reading and interpretation of all available documented information 2.2 Design the bore to ensure the exclusion of unsuitable surface waters 2.3 Select a bore site that will prevent contamination and minimise interference with other bores and adhere to occupational health and safety requirements 2.4 Determine a drilling fluid program to suit the expected down hole conditions 2.5 Select likely water entry mechanisms from the formation to the bore such as open hole, slotted casing, screens or gravel packs 2.6 Calculate appropriate artificial gravel pack design parameters and recommended annular thickness requirements 2.7 Plot and interpret formation sieve analysis results onto graphs 2.8 Undertake calculations to determine appropriate screen/slot design parameters (i.e. diameter, length, aperture size) 2.9 Select appropriate bore/surface casing type, size, strength and wall thickness for the anticipated ground water quality and pressure conditions and any construction requirements 2.10 Ensure all necessary materials anticipated for the job are

	available and on site prior to commencement of construction phase
3. Construct production bores in single aquifer systems	3.1 Carry out any pre-start and start up procedures on plant or ancillary equipment 3.2 Identify, select and apply rig operational controls 3.3 Select, slot, assemble, and insert casing and screens suitable for the formations in which they are deployed 3.4 Select, mix and place grout or otherwise seal surface casing to whatever depths necessary and with a minimum grout sheath thickness of 20mm to protect bore from surface or shallow subsurface waters that may be contaminated or polluted 3.5 Use and maintain drilling fluids and additives within the manufacturer's recommendations and that are non-toxic and capable of being completely removed from the bore upon completion 3.6 Maintain, test and record fluid properties such as viscosity, mid weight, filtration and sand content so that the potential capacity, efficiency and quality of the bore is not affected 3.7 Maintain plumbness and alignment of the hole within the required limitations and perform plumbness tests where required 3.8 Collect, store, record, label and transport formation and water samples for mechanical and/or chemical analysis 3.9 Maintain all records accurately and legibly 3.10 Accurately calculate hole, annular fill, gravel pack and mud pit volumes in cubic metres or litres 3.11 Select appropriate gravel pack or stabilising gravel fill materials 3.12 Place artificial or stabilising gravel fill if required in a manner that will ensure uniform distribution in the annular space without bridging, voids or segregation 3.13 Comply with relevant workplace occupational health and safety requirements for both the drilling equipment and construction materials 3.14 Maintain tool string inventories 3.15 Identify and protect headworks of the bore 3.16 Construct headworks to seal and cap the bore from surface water pollutants, environmental concerns (e.g. flooding), damage and vandalism 3.17 Incorporate methods for measuring static and pumping

	water levels in headworks and for adequate sealing when not in use 3.18 Remove drilled fluids from the bore to allow subsequent development 3.19 Dispose of/neutralise wastewater or hazardous materials from site and complete restoration of the bore site and camp facilities 3.20 Maintain tool strings and inventories
4. Develop bore	4.1 Use bore development techniques with care to prevent collapsing of casing or screens 4.2 Use development techniques to improve hydraulic transmissivity around the bore 4.3 Undertake development until a continuous, clean supply of water is obtained, in accordance with acceptable and practical limits set by site, contractual or regulatory requirements 4.4 Measure/calculate and record standing and drawdown water levels 4.5 Perform pump and development tests to estimate the sand content and sustainable yield of the bore
5. Disinfect/decontaminate bore and drilling equipment	5.1 Clean and disinfect/decontaminate drilling equipment and tools before working on new sites to comply with relevant standards or regulatory requirements 5.2 Disinfect bores and installed equipment constructed for potable supplies using chlorine or proprietary chemical solution or steam 5.3 Handle hazardous chemicals in accordance with safety data sheets (SDS) 5.4 Remove and dispose of/ neutralise any disinfecting agents from the bore upon completion
6. Carry out bore maintenance and rehabilitation	6.1 Carry out and shutdown procedures and secure equipment Undertake a process of diagnosis to determine likely cause of bore deterioration 6.2 Devise a program of rehabilitation to ensure that the bore is restored to a reasonable condition

7. Decommission test/bore holes	7.1 Determine suitable decommissioning procedures and select appropriate materials 7.2 Carry out the decommissioning (abandonment) of test holes or bore holes in single aquifer systems 7.3 Verify position/location of hole for future reference 7.4 Dispose of drill and other fluids safely 7.5 Carry out housekeeping requirements
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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit. Further information is available in the Resources and Infrastructure Industry Training Package Companion Volume.

Unit Mapping Information

RIINHB325A Construct and complete single aquifer production bores

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=88a61002-9a21-4386-aaf8-69c76e675272>

Assessment Requirements for RIINHB325D Construct and complete single aquifer production bores

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Performance Evidence

Evidence is required to be collected that demonstrates a candidate's competency in this unit. Evidence must be relevant to the roles within this sector's work operations and satisfy all of the requirements of the performance criteria of this unit and include evidence that the candidate:

- locates and applies relevant documentation, policies and procedures
- implements the requirements, procedures and techniques for the safe, effective and efficient completion of single aquifer production bore construction including:
 - interpreting geological and survey data
 - applying aquifer sand sieve analysis tests
 - calculating the specific capacity of a bore
 - calculating the grout component quantities for small grouting jobs (e.g. plugs)
 - calculating the hole and annular volumes
- works effectively with others to undertake and complete the construction of single aquifer production bores that meets all of the required outcomes including:
 - complying with written and verbal reporting requirements and procedures
 - communicating clearly and concisely with others to receive and clarify work instructions
 - communicating clearly and concisely with others to resolve coordination requirements prior to commencing and during work activities

- demonstrates completion of constructing and completing single aquifer production bore that safely, effectively and efficiently meets all of the required outcomes on more than one (1) occasion including:
 - designing the bore to ensure the exclusion of unsuitable waters
 - selecting a bore site that will prevent contamination and minimise interference with other bores and adhere to occupational health and safety requirements
 - selecting likely water entry mechanism from the formation to the bore such as open hole, slotted casing screens, gravel packs
 - assembling and inserting casing and screens
 - completing grouting operations to seal intermediate and/or production casing strings or to seal selected zones
 - maintaining plumbness and alignment of the hole within the required limitations
 - continuing development until a continuous, clean supply of water is obtained, in accordance with site, contractual or regulatory requirements
 - performing pump and development tests to estimate the sand content and sustainable yield of the bore

Knowledge Evidence

The candidate must demonstrate knowledge in constructing and completing single aquifer production bores through:

- accessing, interpreting and applying the organization and site requirements and procedures for:
 - work, health and safety
 - environmental issues
 - operating drill rig
 - housekeeping
- equipment characteristics, technical capabilities and limitations
- basic geological formations, i.e. basic knowledge of both soil and rock classifications and various formations which permit groundwater movement and factors affecting groundwater quality for aquifer systems, including drillability and stability
- potential safety hazards and sources of contamination when siting a bore
- the necessity of having a signed agreement/contract with the client
- testing for alignment and plumbness of bores
- the appropriate casing materials for various applications
- the applications for wire-wound screens
- the casing requirements, slotting techniques, slot location and orientation
- the sieve analysis results
- the applications for natural pack, stabilising fill and artificial pack completion techniques
- the objectives of bore development
- the test pumping procedures

- complying with the appropriate disinfecting chemicals and procedures
- understanding the characteristics of ‘good samples’ required for water well construction
- the ways in which sampling errors can occur
- types of drilling fluids, their selection, use, testing and conditioning
- problem solving techniques
- the grout placement methods and procedures
- using numerical knowledge to calculate:
 - volume (e.g. mud pits, drums, tanks or bore holes of given dimensions, annulus)
 - up hole velocity
 - cement/water/additives quantities
 - screen design parameters
 - flow rates (e.g. L/sec, GPM)
 - conversion from imperial to metric and vice versa
 - conducting a sieve analysis
 - the appropriate fishing operations for the type(s) of drilling being undertaken
 - being prepared for fire/accident/emergency

Assessment Conditions

- An assessor of this unit must satisfy the requirements of the NVR/AQTF or their successors; and Industry regulations for certification and licensing; and,
- this unit must be assessed in the context of this sector’s work environment; and,
- this unit must be assessed in compliance with relevant legislation/regulation and using policies, procedures, processes and operational manuals directly related to the industry sector for which it is being assessed; and,
- assessment may be conducted in conjunction with the assessment of other Units of Competency; and,
- assessment must confirm consistent performance can be applied in a range of relevant workplace circumstances; and,
- assessors must demonstrate the performance evidence, and knowledge evidence as outlined in this Unit of Competency, and through the minimum years of current* work experience specified below in an Industry sector relevant to the outcomes of the unit; or,
- where the assessor does not meet experience requirements a co-assessment or partnership arrangement must exist between the qualified assessor and an Industry subject matter expert. The Industry subject matter expert should hold the unit being assessed (or an equivalent unit) and/or demonstrate equivalence of skills and knowledge at the unit level. An Industry technical expert must also demonstrate skills and knowledge from the minimum years of current work experience specified below in the Industry sector, including time spent in roles related to the unit being assessed; and,
- assessor and Industry subject matter expert requirements differ depending on the Australian Qualifications Framework Level (AQF) of the qualification being assessed and/or Industry Sector as follows:

Industry sector	AQF** Level	Required assessor or Industry subject matter expert experience
Drilling, Metalliferous Mining, Coal Mining, Extractive (Quarrying) and Civil Construction	1	1 Year
	2	2 Years
Drilling, Coal Mining and Extractive (Quarrying)	3-6	3 Years
Metalliferous Mining and Civil Construction	3-6	5 Years
Other sectors	Where this Unit is being assessed outside of the Resources and Infrastructure Sectors assessor and/or Industry subject matter expert experience should be in-line with industry standards for the sector in which it is being assessed and where no Industry standard is specified should comply with any relevant regulation.	

*Assessors can demonstrate current work experience through employment within Industry in a role relevant to the outcomes of the Unit; or, for external assessors this can be demonstrated through exposure to Industry by conducting frequent site assessments across various locations.

**Where a unit is being delivered outside of a Qualification the first numeric character in the Unit code should be considered to indicate the AQF level

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