



Australian Government

RIINHB322E Construct multiple aquifer production bores

Release: 1

RIINHB322E Construct multiple aquifer production bores

Modification History

Release	Comments
Release 1	This version first released with RII Resources and Infrastructure Industry Training Package Version 5.0.

Application

This unit describes the skills and knowledge required to construct multiple aquifer production bores. It includes designing, constructing and developing multiple aquifer bores, disinfecting bores and equipment and decommissioning bores.

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, legislative and certification requirements that may apply to this unit can vary between states, territories, and industry sectors and must be sourced from relevant jurisdictions prior to applying this unit.

Unit Sector

Drilling

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Plan and design for constructing multiple aquifer bores	1.1 Obtain, interpret and confirm work requirements 1.2 Access, interpret and apply multiple aquifer drilling documentation and confirm work activity is compliant 1.3 Identify and minimise environmental issues and potential hazards, and assess and address risks within scope of own role and according to workplace procedures 1.4 Site a bore and design multiple aquifer bore according to work and legislative requirements 1.5 Select and wear personal protective equipment required for work activity

ELEMENT	PERFORMANCE CRITERIA
	1.6 Communicate with other personnel at site according to work requirements and confirm briefings and handover details are communicated and received
2. Construct and develop multiple aquifer bores in line with established requirements	2.1 Drill and isolate target production zone from other formations 2.2 Log strata encountered during drilling according to workplace procedures 2.3 Confirm or amend bore design based on testing and encountered geology 2.4 Construct bore according to confirmed or amended design using advanced construction techniques (multiple casing strings and pressure cementing) 2.5 Undertake bore development until a continuous, clean supply of water is obtained, in accordance with acceptable and practical limits set by site, contractual or regulatory requirements 2.6 Estimate yield by using yield testing methodologies 2.7 Complete written bore construction record according to workplace procedures
3. Disinfect/decontaminate bore and drilling equipment in line with established requirements	3.1 Determine and monitor potential contaminants of drilling equipment 3.2 Disinfect/decontaminate bores and installed equipment constructed for potable supplies
4. Decommission bore holes in line with established requirements	4.1 Determine suitable decommissioning procedures for failed or unwanted bores and select appropriate materials 4.2 Seal the bore as per legislative requirements

Foundation Skills

This section describes those language, literacy and numeracy and employment skills that are essential to performance.

SKILL	DESCRIPTION
Numeracy	Identifies and comprehends relevant mathematical information and formulae in relation to constructing multiple aquifer bores
Writing	Produces and completes workplace reports, including maintenance schedules using appropriate vocabulary, grammatical structures and conventions

Unit Mapping Information

Supersedes and is equivalent to RIINHB322D Construct multiple aquifer production bores.

Links

Companion Volume implementation guides is found on VETNet -

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

Assessment Requirements for RIINHB322E Construct multiple aquifer production bores

Modification History

Release	Comments
Release 1	This version first released with RII Resources and Infrastructure Industry Training Package Version 5.0.

Performance Evidence

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

- construct multiple aquifer production bores on at least three occasions, including:
 - planning and preparing for constructing multiple aquifer bores, including:
 - selecting a bore site to prevent contamination and minimise interference with other bores
 - selecting appropriate drilling method for planned geology in a multiple aquifer system (potential drilling methods include rotary air, rotary mud, sonic, cable tool and auger)
 - designing a multiple aquifer bore to ensure the exclusion of unsuitable waters and to prevent the inter-mixing of aquifers with different water quality or Standing Water Levels
 - constructing and developing multiple aquifer bores in line with established requirements, including:
 - drilling and isolating target production zone
 - identifying and logging strata encountered during drilling including aquifer and aquitard (confining layer) units
 - confirming or amending bore design based on testing and encountered geology, using:
 - sieve testing
 - lithological logging
 - geophysics testing
 - aquifer yields testing
 - water quality testing
 - selecting likely water entry mechanism from the formation to the bore including stainless steel screens, filter packs, slotted casing and open-hole
 - calculating and making up cement grout volumes and mixing grout component quantities, including:

- cement powder
- water
- bentonite
- other additives as required
- calculating hole and annular volumes
- calculating grout specific gravity
- determining appropriate screen and filter pack configuration, accounting for:
 - formation grain size
 - screen aperture
 - annular space
 - filter pack mineralogy, including quartz sand
 - natural filter pack potential (formation)
- constructing bore according to confirmed or amended design, including:
 - assembling and installing casings, seals and screens
 - installing filter pack
 - grouting
- sealing intermediate and/or production casing strings or seal selected zones to complete grouting operations
- continuing development until a continuous, clean supply of water is obtained
- estimating yield by using methodologies of:
 - air lifting
 - pumping
- disinfecting/decontaminating bore and drilling equipment in line with established requirements, including:
 - disinfecting bores and installed equipment using proprietary chemical solution
- decommissioning bore holes in line with established requirements, including:
 - decommissioning failed or unwanted bores as required.

During the above, the candidate must:

- locate and apply required documentation, standards, policies and procedures
- select and wear personal protective equipment required for work activities
- maintain plumbness and alignment of the hole within limitations
- use a range of communication techniques and equipment essential to the safe completion of work activity, including hand, audible and other signals
- meet written and verbal reporting requirements and procedures associated with equipment operations.

Knowledge Evidence

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

- key legislation required to construct multiple aquifer production bores
- key policies, procedures and established requirements for constructing multiple aquifer bores, including those for:
 - Minimum Construction Requirements (MCR)
 - workplace health and safety
 - environmental practice
 - accidents and emergencies
 - safety data sheets (SDS)
 - housekeeping
- key factors affecting multiple aquifer bore performance, including:
 - properties, uses and effects of and differences between:
 - single and multiple aquifers
 - drilling fluids
 - casings
 - cement (grout) additives
 - grout placement methods and procedures
 - hole preparation for cementing (grouting) operations
 - pressure cementing methods
 - results of sieve analysis
 - calculations for:
 - up hole velocity
 - specific gravity
 - cement mixes
 - screen design parameters
 - flow rates (including L/sec and GPM)
 - conversion from imperial to metric and vice versa
 - equipment processes, technical capability and limitations
 - casing strength and collapse characteristics
 - applications for wire-wound screens
 - screen design parameters to ensure appropriate entrance velocities
 - types of pathogens and contaminants including bacteria.

Assessment Conditions

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

- include access to:
 - bore site(s)
 - drilling rig and equipment
 - water supply
 - cement grout (cement, water and bentonite)

- casings, seals and screens
- filter pack material
- personal protective equipment
- air compressor or pumping equipment
- potable supply disinfectant
- personal protective equipment
- be conducted in a safe environment
- be assessed in context of the sector's work environment
- be assessed in compliance with relevant legislation and regulations and using policies, procedures, processes and operational manuals 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.

Assessor requirements

Assessors must be able to clearly demonstrate current and relevant industry knowledge and experience to satisfy the mandatory regulatory standards as set out in the Standards for Registered Training Organisations (RTOs) 2015/AQTF mandatory requirements for assessors current at the time of assessment and any relevant licensing and certification requirements. This includes:

- vocational competencies at least to the level being delivered and assessed
- current industry skills directly relevant to the training and assessment being provided
- current knowledge and skills in vocational training and learning that informs their training and assessment
- formal relevant qualifications in training and assessment
- having knowledge of and/or experience using the latest techniques and processes
- possessing the required level of RII training product knowledge
- having an understanding and knowledge of legislation and regulations relevant to the industry and to employment and workplaces
- demonstrating the performance evidence, and knowledge evidence outlined in this unit of competency, and
- the minimum years of current** work experience after competency has been obtained as specified below in an industry sector relevant to the outcomes of the unit.

It is also acceptable for the appropriately qualified assessor to work with an industry expert to conduct assessment together and for the industry expert to be involved in the assessment judgement. The industry expert must have current industry skills directly relevant to the training and assessment being provided. This means the industry subject matter expert must demonstrate skills and knowledge from the minimum years of current work experience after competency has been obtained as specified below, including time spent in roles related to the unit being assessed:

Industry sector	AQF indicator 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, Extractive (Quarrying), Metalliferous Mining and Civil Construction	3-6	3 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.	

*Guidance on simulated environments has been stipulated in the RII implementation guide located on VETNet.

**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 a minimum number of site assessments as determined by the relevant industry sector, across various locations.

*** While a Unit of competency does not have an AQF level, where a unit is being delivered outside of a qualification the first numeric character in the unit code should be considered as the AQF indicator level for assessment purposes.

Links

Companion Volume implementation guides is found on VETNet -

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