Australian Government

# Assessment Requirements for NWPHYS007 Use underwater acoustics to map waterways

**Release: 1**

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## Modification History

Release 1. This is the first release of this unit of competency in the NWP National Water Training Package.

## Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least one occasion and includes:

- adjusting acoustic parameters for optimum performance during sounding operations
- analysing and reporting echo sounder returns through differentiation between return signals
- analysing and reporting on the following:
  - problems or artefacts in on-line data due to inappropriate configuration or changing environmental parameters
  - side scan sonar records considering target characteristics, system configuration, potential sources of noise and distortion
  - sources of error and angle uncertainty depending on acoustic parameter configuration
- analysing sounding data and identifying the marine floor type using backscatter analysis
- analysing the water column to identify features
- applying quality control procedures to data acquisition and on-line processing
- calculating and reporting on components contributing to uncertainty in derived ranges
- creating sound speed profiles from water column measurements and describing the effect on the acoustic ray path
- detailing sources of noise and the impact of noise on operation of acoustic systems
- reviewing acoustic results and reporting to relevant personnel
- selecting appropriate range, scale, frequency and pulse repetition rate for marine floor surface return and assessment of sediment layer in relation to spatial resolution, bottom penetration and depth of water
- setting up, deploying and operating all of the following types of underwater sonar systems including:
  - side scan
  - single beam
  - swath echo sounders

## Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria and includes knowledge of:

- acoustic wave behaviour with reference to physical properties of the water column
- active sonar equation including:
  - causes of propagation loss in relation to water properties together with characteristics of the sea floor and targets
  - noise level and directivity
  - sound source
- characteristics of acoustic units, intensities and sound levels
- combining sources of uncertainty
- echo sounders including:
  - bottom detection principles
  - components of a single beam echo sounder
  - full echo envelope returns
  - operation of single beam echo sounders
  - split beam and dual beam echo sounders
  - sub-bottom profiling systems
- plane and spherical waves including:
  - amplitude
  - frequency
  - wavelength
- principles and geometry of multibeam and interferometric (phase measurement) sonar systems
- principles, components, geometry and deployment of side scan sonar systems
- quality control procedures for hydrographic surveys
- refraction and the path of sound rays through the water column
- side scan including:
  - images and sources of distortion
  - sonar backscatter and floor reflection
- speed of sound in relation to water properties and profile in the water column
- swath echo sounders systems including:
  - amplitude and phase bottom detection
  - backscatter and seabed classification
  - beam forming and beam steering
  - gain, power and pulse length
  - hull and pole mounting of transducers considering platform motion
  - integration of components including:
    - attitude compensation
    - networking
    - sensor offsets
    - time stamping
  - optimisation of environmental factors for measurement and target detection

- surface and water column sound speed monitoring
- system parameters including:
  - bandwidth
  - detection
  - gain
  - pulse length
  - pulse repetition rate
  - range resolution
  - spatial resolution
  - threshold
- transducer parameters impacting beam characteristics, elements and arrays
- validation and calibration for hydrographic surveys
- variations in beam spacing and footprint size

## Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations. Where this is not appropriate, assessment must occur in suitable simulated workplace operational situations reflecting actual workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment currently used in industry
- applicable relevant documentation including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

## Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037