



Australian Government

**Assessment Requirements for MARH034
Demonstrate fundamental knowledge of
Autonomous Maritime Systems (AMS)
operations**

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Modification History

Release 1. This is the first release of this unit of competency in the MAR Maritime Training Package.

Performance Evidence

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

- describing best practise Autonomous Underwater Vehicles (AUV) mission planning to account for submerged riverbeds, steep terrain, strong currents and maritime infrastructure
- describing the complexities around Autonomous Maritime Systems (AMS) insurance and the concept of ‘self-insurance’
- describing the core functions of mission planning software, including key interactions with AMS
- describing the key phases, equipment requirements and personnel roles in AMS operations
- describing the process for obtaining standard navigational charts, maps and navigation aids and how to read critical information to inform mission planning
- explaining the different rationales for depth-controlled vs altitude-controlled transects/missions for AUV operations
- identifying factors that can result in AMS mission failure and loss, including weather, currents, navigation, support vessel, traffic, obstacles, power, sensors, propulsion and developing a contingency plan addressing these factors
- identifying potential liabilities associated with AMS operations
- outlining fundamental work health and safety (WHS)/occupational health and safety (OHS) risks associated with the standard operating procedures for AMS
- outlining the importance of post-mission analysis and vehicle performance analysis and their interplay
- outlining the key challenges that will face AMS operators with multi-platform and cross-platform operations
- outlining the principles underpinning best practise data management
- using charts to support mission planning.

Knowledge Evidence

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

- best practice data management techniques, including:
 - backup and storage
 - intra-mission data quality checks
 - metadata records
 - sensor calibration files
- best practise mission planning techniques to account for:
 - maritime infrastructure
 - steep terrain for AUV operations
 - strong currents
 - submerged riverbeds for AUV operations
- core elements of mission planning software for commonly used for AMS operations, including:
 - depth and altitude settings for AUV operations
 - importing navigational charts
 - mow-the-lawn surveys
 - setting start and endpoints
 - setting waypoints and transects
 - speed settings
 - target acquisition surveys
- critical team elements and roles for AMS operations, including:
 - deck operations (launch and recovery) specialist
 - lead mission controller
 - operator
 - payload specialist
 - technical specialist
- critical elements of search and rescue, including:
 - additional location sources
 - cost
 - currents
 - drop-weight release timing
 - last known position
 - operational window for support vessel
 - remotely operated vehicle support
- documentation and records for AMS operations, including the content and purpose of:
 - Australian Maritime Safety Authority (AMSA) requirements
 - incident reports
 - logbooks, including fault logs
 - metadata
 - risk assessment
- evolution and current state of AMSA's regulatory framework for AMS, including:

- autonomous operations
- underwater operations
- factors to be included in contingency plans where applicable, including:
 - AMS failures
 - compromised survey area or recovery point
 - emergency departure of support vessel
 - position reference failures
 - unknown terrain
 - weather and sea state
- hazards and risks to be considered when conducting AMS operations, including:
 - currents and tides
 - launch and recovery
 - lithium polymer batteries and recharging
 - manager error
 - maritime infrastructure
 - operator error
 - other vessels including other AMS
 - overhead objects
 - seafloor and submerged objects
 - weather and sea-state
- key historical AMS case studies involving damage, liability, loss and recovery and total loss
- key challenges for AMS operators in the future, including:
 - conducting cross-platform campaigns
 - conducting multi-platform campaigns
 - integrating new and emerging AMS technologies, including sensors
- key information from charts to inform mission planning, including:
 - confidence levels
 - depths
 - maritime infrastructure
 - slope angles
- post-mission analysis and vehicle performance analysis, including:
 - techniques to assess mission success and refine data collection
 - techniques used to troubleshoot and improve the behaviour of AMS.

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

Assessment must occur in workplace operational situations, where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Resources for assessment must include access to:

- applicable documentation such as workplace policies and procedures, regulations, codes of practice, operation manuals, and operating procedures
- tools, equipment, machinery, materials, and relevant personal protective equipment (PPE) currently used in industry.

Links

Companion Volume Implementation Guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=772efb7b-4cce-47fe-9bbd-ee3b1d1eb4c2>