



Australian Government

Department of Education, Employment and Workplace Relations

NWP340A Measure and process hydrometric stream discharge data using wading gaugings

Release: 2

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Modification History

NWP340A Release 2: Layout adjusted. No changes to content.
NWP340A Release 1: Primary release.

Unit Descriptor

This unit of competency describes the outcomes required to collect hydrometric stream discharge data using wading gaugings. An understanding of risk assessment and factors affecting the accuracy and precision of the area-velocity method are essential to performance.

Application of the Unit

This unit supports the attainment of skills and knowledge required for hydrographers, field hydrologists and related staff.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Not applicable.

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the required performance needed to demonstrate achievement of the element. Where <i>bold italicised</i> text is used, further information is detailed in the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to collect hydrometric stream gauging data.	1.1 Identify, analyse and confirm the <i>data collection regime</i> required by the organisation. 1.2 Select appropriate <i>testing equipment</i> and confirm its calibration and maintenance status in accordance with organisational procedures. 1.3 Evaluate <i>site conditions</i> and prepare for the taking of measurements in accordance with <i>organisational procedures and relevant industry standards</i>. 1.4 Select the cross-section for discharge measurement.
2 Collect depth and velocity data.	2.1 Accurately measure the width of the section. 2.2 Select appropriate sounding points (verticals) to subdivide the cross-section. 2.3 Accurately measure the depth of vertical. 2.4 Select the appropriate measurement equipment to suit the ambient conditions. 2.5 Collect velocity data at appropriate depth(s) for each vertical.
3 Calculate discharge.	3.1 Calculate the point velocity. 3.2 Calculate the mean velocity for each vertical. 3.3 Calculate the area of sub-section corresponding to each vertical. 3.4 Calculate the discharge corresponding to each sub-section. 3.5 Calculate the area and discharge at the section by summation of the sub-section data. 3.6 Apply corrections for oblique flow as required.
4 Complete recording and reporting requirements for discharge measurement.	4.1 Gather <i>relevant supporting information</i> from the site and accurately complete documentation in accordance with organisational procedures. 4.2 Calculate and record the mean stage height and rate of change using relevant <i>mathematical techniques</i>. 4.3 Grade and record the gauging quality. 4.4 Check records in accordance with organisational procedures. 4.5 Enter gauging into ratings database in accordance with organisational procedures.

Required Skills and Knowledge

This describes the essential skills and knowledge and their level, required for this unit.

Required skills:

- assesses risks and takes appropriate precautions/actions
- maintains testing equipment in good order and calibration
- interpret and apply technical documentation
- use surveying equipment to identify site location
- perform basic mathematical calculations (addition, subtraction, multiplication, division, rounding)
- use safety equipment and personal protective equipment appropriately
- identify potential or actual operational problems
- communicate with employees and customers
- use computer systems
- use communication systems
- give and receive instructions

Required knowledge:

- performance and limitations of the monitoring systems and sites employed in monitoring the network/catchment
- principle of area-velocity measurement of discharge
- turbulent and laminar flow
- testing procedures
- occupational health and safety procedures
- policies and standard operating procedures
- communication systems

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

The candidate should demonstrate the ability to collect hydrometric stream discharge data using wading gaugings including:

- gathering, interpreting and applying complex documentation related to the specification of hydrographic data collection and reporting procedures
- collecting sample accurately
- analysing and verifying data using standard procedures, software and databases
- preparing clear and accurate reports
- storing and archiving data
- identifying, reporting and (within scope of job function) solving potential or actual problems

Context of and specific resources for assessment

Access to the workplace and resources including:

- documentation that should normally be available in a water industry organisation
- relevant codes, standards, and government regulations

Where applicable, physical resources should include equipment modified for people with disabilities.

Access must be provided to appropriate learning and/or assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the language and literacy capacity of the candidate and the work being performed.

Validity and sufficiency of evidence requires that:

- competency will need to be demonstrated over a period of time reflecting the scope of the role and the practical requirements of the workplace
- where the assessment is part of a structured learning experience the evidence collected must relate to a number of performances assessed at different points in time and separated by further learning and practice
- a decision of competence should only be made when the assessor has complete confidence in the person's competence over time and in various contexts
- all assessment that is part of a structured learning experience must include a combination of direct, indirect and supplementary evidence
- where assessment is for the purpose of recognition

(RCC/RPL), the evidence provided will need to be authenticated and show that it represents competency demonstrated over a period of time

- assessment can be through simulated project-based activity and must include evidence relating to each of the elements in this unit

In all cases where practical assessment is used it will be combined with targeted questioning to assess the underpinning knowledge. Questioning will be undertaken in a manner appropriate to the skill levels of the operator, any cultural issues that may affect responses to the questions, and reflecting the requirements of the competency and the work being performed.

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the Performance Criteria, is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

- Data collection regime*** may include:
- performance agreements
 - quality assurance
 - catchment gauging sites
 - work schedules
 - work priorities
 - procedures, codes and standards
- Testing equipment*** may include:
- surveying equipment (staffs, levels, GPS, EDM, measuring tapes)
 - stage measurement devices (gauge boards, submersible pressure transducer, gas-purge systems, shaft encoder, radar)
 - mechanical current meters
 - meter rods
 - electronic counters
 - Acoustic Doppler Velocity meters
- Site conditions*** may include:
- gauge height
 - debris
 - conditions affecting safety
 - turbulence
 - angled flow
 - wind
 - aquatic growth
- Organisational procedures and relevant industry standards*** may include:
- Standards relevant to the monitoring network including AS 3778 for water measurement installations, WMO/Bureau of Meteorology guidelines for siting of meteorological sensors and systems and best practice methodology where standards are not available or applicable
 - water data base management software for triggering alarms, notifications, advice to relevant authorities and management for actions
 - instrument calibration
 - procedures for discharge measurement in open channels using mechanical current meters (waded gaugings, flood gaugings by cableways/travellers/boats)
 - procedures for data logging (programming, interrogation, data downloading, data security)

- Relevant supporting information*** may include:
- procedures for the measurement of surface slopes and flood slopes
 - procedures for the development, maintenance and extension of rating curves
 - location of section
 - personnel details
 - details of any clearing of the section undertaken
 - details of testing equipment used
 - date and time
 - floating debris
 - gauge heights
 - the quality of the gauging
 - photographic record
 - sketch
- Mathematical techniques*** that may be used include:
- conversion of units
 - graphical analysis
 - calculation of point velocity using ratings for mechanical current meters

Unit Sector(s)

Not applicable.

Competency field

Hydrography.