



**Australian Government**

# **MSS024006 Perform sampling and testing of water**

**Release: 1**

# MSS024006 Perform sampling and testing of water

## Modification History

Release 1. Supersedes and is equivalent to MSS024006A Perform sampling and testing of water

## Application

This unit of competency covers the ability to sample natural, polluted and process water for both chemical and microbiological parameters and perform field measurements on them.

This unit of competency is applicable to environmental technicians working in a range of industry sectors, such as environmental services (e.g. sampling and monitoring of water); clean water (e.g. catchments, supply and environmental flows); natural resource management; water treatment, storm and wastewater management; environmental compliance, auditing and inspection; solid and hazardous waste management; site remediation; management of contaminated sites; geotechnical services and civil engineering.

While no specific licensing or certification requirements apply to this unit at the time of publication, environmental monitoring and management activities are governed by relevant legislation, regulations and/or external accreditation requirements. Local requirements should be checked.

## Pre-requisite Unit

Nil

## Competency Field

Sampling and testing

## Unit Sector

Environmental

## Elements and Performance Criteria

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

- |                                                    |                                                                                                                                                          |
|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1 Confirm sampling and testing requirements</b> | <b>1.1</b> Confirm the sampling location, number and type of samples, and timing and frequency of sampling from the workplace or client's sampling plan. |
|                                                    | <b>1.2</b> Check that all sampling and testing procedures are in accordance with client or workplace requirements,                                       |

relevant standards and codes.

- |   |                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2 | <b>Prepare for water sampling</b> | <div style="padding-left: 20px;">2.1 Identify site and sampling hazards and review workplace safety procedures.</div> <div style="padding-left: 20px;">2.2 Liaise with relevant personnel to arrange site access and all necessary clearances and/or permits.</div> <div style="padding-left: 20px;">2.3 Select sampling equipment and conditions to achieve representative samples and preserve sample integrity during collection, storage and transit.</div> <div style="padding-left: 20px;">2.4 Ensure all reagents, solutions, standards and blanks (as appropriate) are obtained and/or prepared ready for field use.</div> <div style="padding-left: 20px;">2.5 Select field test equipment/instruments and check operation and calibration, as required, in accordance with procedures and manufacturer instructions.</div> <div style="padding-left: 20px;">2.6 Assemble and check all sampling equipment, field test equipment, materials, containers and safety equipment.</div> <div style="padding-left: 20px;">2.7 Arrange suitable transport to, from and/or around site as required.</div> |
| 3 | <b>Conduct sampling of water</b>  | <div style="padding-left: 20px;">3.1 Locate sampling sites and, if required, services at the site.</div> <div style="padding-left: 20px;">3.2 Conduct representative sampling in accordance with sampling plan and defined procedures for field and/or laboratory testing, as required.</div> <div style="padding-left: 20px;">3.3 Ensure all controls, blanks and replicate samples are properly integrated into the sampling process.</div> <div style="padding-left: 20px;">3.4 Record all information and label samples in accordance with traceability requirements.</div> <div style="padding-left: 20px;">3.5 Record environmental conditions and any atypical observations made during sampling that may impact on sample representativeness or integrity.</div> <div style="padding-left: 20px;">3.6 Transport all samples back to base according to workplace procedures and relevant codes.</div>                                                                                                                                                                                                |

- 3.7 Distribute samples/sub-samples to required destinations for testing, maintaining sample integrity, traceability and chain of custody requirements, as necessary.
- 4 **Conduct field testing of water**
- 4.1 Obtain sample or sub-sample for designated field test, or locate testing location for in-situ testing.
- 4.2 Check equipment/instruments set-up and reagents and calibrate, as necessary, to ensure safe operation and valid results.
- 4.3 Run quality control (QC) samples to check method validity.
- 4.4 Operate equipment/instruments in accordance with test method requirements.
- 4.5 Perform tests/procedures/observations on all samples, and standards, if appropriate, in accordance with specified methods.
- 4.6 Record all field observations and results and ensure that they are accurately transferred to workplace information database.
- 5 **Maintain a safe work environment**
- 5.1 Use defined safe work practices and personal protective equipment to ensure personal safety and that of others.
- 5.2 Minimise the generation of waste.
- 5.3 Rehabilitate sampling site to render it safe and minimise environmental impacts.
- 5.4 Clean all equipment, containers, work area and vehicles according to workplace procedures.
- 5.5 Check serviceability of all equipment before storage.
- 5.6 Ensure the safe collection of all hazardous wastes for appropriate disposal.

## Foundation Skills

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

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

## Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

**Legislation, regulations, standards, codes, workplace procedures and requirements include the latest version of one or more of:**

- federal legislation, such as the Environment Protection and Biodiversity Conservation Act and National Environmental Protection Measures
- state/territory government legislation and local government by-laws, policies, regulations and plans dealing with land use; environmental protection; cultural/heritage sites; vegetation management; nature conservation and wildlife/plant protection; water and water management; soil conservation; pollution and contaminated sites; fisheries, forestry and mining operations
- legislation, standards and codes of practice for work health and safety (WHS)
- Australian and international standards covering environmental management such as AS/NZS ISO 14000 Basic Set:2007 Environmental Management Basic Set, and the sampling and analysis of water, such as AS/NZS 2031, AS 3550 series, AS/NZS 4276 series, AS/NZS 5667 series
- industry methods and guidelines, such as US Environmental Protection Authority (EPA) Methods and guidance for the analysis of water; American Public Health Association (APHA) Standard methods for the examination of waters and wastewaters; ANZECC Guidelines for fresh and marine water quality; and Australian guidelines for water quality monitoring and reporting
- registration/licensing and/or accreditation requirements
- site-specific requirements; workplace procedures for sampling, monitoring and in-field testing; recording, processing, presenting and reporting data
- workplace documents, such as standard operating procedures (SOPs), work schedules, recording and reporting procedures, equipment manuals and warranties, supplier catalogue and handbooks; safety data sheets (SDS) and safety procedures; waste minimisation,

containment, processing and safe disposal procedures.

**Common field test parameters include one or more of:**

- pH
- electrical conductivity
- dissolved oxygen
- salinity
- temperature
- turbidity
- Secchi disk depth.

**Laboratory and/or field test parameters include one or more of:**

- total suspended solids
- volatile suspended solids
- nitrogen (nitrate, organic, ammonia and Kjeldahl)
- phosphorus (total and soluble reactive)
- chlorophyll and phaeophytin
- total organic carbon (TOC)
- biological oxygen demand (BOD)
- chemical oxygen demand (COD)
- silica
- metals (total and dissolved)
- organic and inorganic pollutants
- microorganisms.

**Workplace procedures for field activities include one or more of:**

- use of field notebooks or log books
- SOPs covering fieldwork, sampling and testing
- equipment operating manuals, calibration procedures, instrument fault-finding procedures and general maintenance and repair procedures
- emergency, first aid and survival procedures
- requirements related to protection of the environment
- incident/accident/injury report forms.

**Equipment includes one or more of:**

- navigation and communication equipment (e.g. compass, maps, global positioning system (GPS), two-way radio and mobile phone)
- survey equipment
- data loggers
- sampling equipment and containers, filters and sieves and animal cages
- parameter specific meter or multi-probes (e.g. dissolved

oxygen, electrical conductivity, pH, turbidity, nitrates, phosphates and temperature)

- field test kits to determine such parameters as dissolved gases, chemical anions and cations, heavy metals, E. coli and BOD
- portable colorimeters and field microscopes
- soil monitoring kits
- first aid equipment.

**Hazards include one or more of:**

- solar radiation, dust and noise
- personnel getting lost
- accidents, emergencies and incidents, such as snake, insect or animal bites
- exposure to severe weather conditions
- manual handling of heavy objects
- vehicle and boat handling in rough/remote conditions.

**WHS and environmental management requirements include:**

- compliance with relevant federal/state/territory WHS legislation at all times
- assuming that samples are potentially hazardous and applying standard precautions
- accessing and applying current industry understanding of infection control issued by the National Health and Medical Research Council (NHMRC) and state/territory Departments of Health, where relevant.

## Unit Mapping Information

Release 1. Supersedes and is equivalent to MSS024006A Perform sampling and testing of water

## Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=5b04f318-804f-4dc0-9463-c3fb9a3fe998>

# Assessment Requirements for MSS024006 Perform sampling and testing of water

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## Performance Evidence

Evidence of competence in this unit must satisfy all of the requirements of the elements and performance criteria, and include demonstration of:

- sampling natural, polluted and/or process water for both chemical and microbiological parameters and conducting field-testing of samples on at least two (2) occasions
- accurately interpreting a sampling plan, relevant standards and codes and associated sampling, testing and data quality procedures
- selecting and checking all required field equipment, instruments and materials and safely transporting them to and from site
- safely setting-up and using field instruments and/or equipment, including field calibration
- obtaining reliable, representative water samples in accordance with sampling plan and close attention to any pre-treatment, containers, preservation, storage, labelling and traceability requirements
- obtaining and recording valid and reliable field test data in accordance with test methods
- accurately recording site features, environmental conditions and any observations that may impact on reliability of field data
- identifying atypical results as out-of-normal range or an artefact
- identifying and rectifying basic instrument faults
- calculating results using appropriate units and precision
- checking the acceptability of environmental data using specified quality tests or procedures
- completing field records, presenting and reporting results in accordance with workplace procedures
- seeking advice when issues/problems are beyond scope of competence/responsibility
- transporting, cleaning, maintaining and storing field equipment in accordance with workplace procedures
- following procedures for working safely and minimising environmental impacts/waste.

## Knowledge Evidence

Must provide evidence that demonstrates knowledge of:

- scientific terminology used in job role covering water chemistry, biology and microbiology
- hydrologic cycle

- fundamentals of aquatic chemistry, including:
  - physical and chemical properties of water
  - chemical equilibria in natural, polluted and process waters
  - biogeochemical processes in freshwater and marine systems
  - water analytical environmental chemistry
  - environmental contaminants in water (fate, transport and bioaccumulation)
- fundamentals of hydrobiology, including:
  - aquatic and benthic flora and fauna
  - aquatic microorganisms
  - marine, estuarine and freshwater ecosystems
  - stratification and eutrophication in water bodies
  - aquatic microbiology
- principles of representative sampling
- principles and procedures for random, systematic and stratified sampling, including consistency of sampling procedures
- preservation of the integrity of samples
- maintaining identification of samples relative to their source
- workplace and/or legal traceability requirements
- cost-effectiveness of sampling
- common characteristics of water to be sampled and likely contaminants
- links between quality control, quality assurance, quality management systems and sampling procedures
- workplace procedures dealing with legislative requirements for the handling, labelling and transport of hazardous goods
- relevant hazards; health and safety and site environmental management requirements; importance of personal and environmental safe work procedures particularly at high risk sites.

## Assessment Conditions

- Judgement of competence must be based on holistic assessment of the evidence. Assessment methods must confirm consistency of performance over time, rather than a single assessment event.
- This unit of competency is to be assessed in the workplace, or a simulated workplace environment. A simulated workplace environment must reflect realistic operational workplace conditions that cover all aspects of workplace performance, including the environment, task skills, task management skills, contingency management skills and job role environment skills.
- Foundation skills are integral to competent performance of the unit and should not be assessed separately.
- 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.

- Knowledge evidence may be collected concurrently with performance evidence or through an independent process such as workbooks, written assessments or interviews (provided a record is kept in each case).
- Holistic assessment methods include:
  - inspection of water samples collected by the candidate against given sampling requirements
  - review of water sampling and testing records completed by the candidate for accuracy and completeness
  - feedback from supervisors that the candidate can safely sample and test natural, polluted and/or process water for both chemical and microbiological parameters and provide reliable test results within the agreed timeframe
  - oral and/or written questions to check the candidate's knowledge of water sampling and testing procedures, set-up and use of equipment; normal ranges; troubleshooting of common sampling and testing problems.
- Access is required to all instruments, equipment, materials, workplace documentation, procedures, and specifications associated with this unit including, but not limited to:
  - vehicles, survey/test equipment, water sampling and monitoring equipment, camera, consumables
  - documentation, including work program, maps and field protocols, codes of practice, user manuals, workplace safety procedures and sampling/test/survey methods.
- Assessors must satisfy the assessor competency requirements that are in place at the time of the assessment as set by the VET regulator.
- The assessor must demonstrate both technical competency and currency.
- Technical competence can be demonstrated through:
  - relevant VET or other qualification/Statement of Attainment AND/OR
  - relevant workplace experience
- Currency can be demonstrated through:
  - performing the competency being assessed as part of current employment OR
  - having consulted with an organisation providing environmental monitoring, management or technology related services about performing the competency being assessed within the last twelve months.

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