



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **MSS024006A Perform sampling and testing of water**

**Release: 1**

## **MSS024006A Perform sampling and testing of water**

### **Modification History**

Not applicable.

### **Unit Descriptor**

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

Note that this unit does not cover the sampling and field testing of groundwater, which is addressed in MSS025006A Collect and evaluate groundwater data. Nor does it cover laboratory analysis of water which is addressed in MSL974003A Perform chemical tests and procedures and MSS025012A Perform environmental microbiological tests.

### **Application of the Unit**

This unit of competency is applicable to environmental technicians in a range of industry sectors, such as:

- environmental services
- environmental compliance, auditing and inspection
- clean water (catchments, supply and environmental flows)
- water treatment, storm and wastewater management
- solid and hazardous waste management, and site remediation
- management of contaminated sites
- geotechnical services and civil engineering
- natural resource management
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### **Licensing/Regulatory Information**

Not applicable.

### **Pre-Requisites**

Not applicable.

### **Employability Skills Information**

Not applicable.

## Elements and Performance Criteria Pre-Content

Not applicable.

## Elements and Performance Criteria

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|---|-------------------------------------------|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Confirm sampling and testing requirements | 1.1 | Confirm the sampling location, number and type of samples, and timing and frequency of sampling from the enterprise or client's sampling plan         |
|   |                                           | 1.2 | Check that all sampling and testing procedures are in accordance with client or enterprise requirements, relevant standards and codes                 |
| 2 | Prepare for water sampling                | 2.1 | Identify site and sampling hazards and review enterprise safety procedures                                                                            |
|   |                                           | 2.2 | Liaise with relevant personnel to arrange site access and, if appropriate, all necessary clearances and/or permits                                    |
|   |                                           | 2.3 | Select sampling equipment and conditions to achieve representative samples and preserve sample integrity during collection, storage and transit       |
|   |                                           | 2.4 | Ensure all reagents, solutions, standards and blanks (as appropriate) are obtained and/or prepared ready for field use                                |
|   |                                           | 2.5 | Select field test equipment/instruments and check operation and calibration, as required, in accordance with procedures and manufacturer instructions |
|   |                                           | 2.6 | Assemble and check all sampling equipment, field test equipment, materials, containers and safety equipment                                           |
|   |                                           | 2.7 | Arrange suitable transport to, from and/or around site as required                                                                                    |

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| 3 | Conduct sampling of water      | 3.1 | Locate sampling sites and, if required, services at the site                                                                                                    |
|   |                                | 3.2 | Conduct representative sampling in accordance with sampling plan and defined procedures for field and/or laboratory testing, as required                        |
|   |                                | 3.3 | Ensure all controls, blanks and replicate samples are properly integrated into the sampling process                                                             |
|   |                                | 3.4 | Record all information and label samples in accordance with traceability requirements                                                                           |
|   |                                | 3.5 | Record environmental conditions and any atypical observations made during sampling that may impact on sample representativeness or integrity                    |
|   |                                | 3.6 | Transport all samples back to base according to enterprise procedures and relevant codes                                                                        |
|   |                                | 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 enterprise information database                                    |

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|---|----------------------------------|-----|----------------------------------------------------------------------------------------------------------------|
| 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 enterprise procedures                     |
|   |                                  | 5.5 | Check serviceability of all equipment before storage                                                           |
|   |                                  | 5.6 | Ensure the safe collection of all hazardous wastes for appropriate disposal                                    |

## Required Skills and Knowledge

### Required skills

Required skills include:

- planning and preparing for field activities
- site observational and descriptive skills
- researching and summarising existing data and reports
- communicating effectively and writing/compiling concise and accurate reports
- field sampling and monitoring procedures, including pre-treatment, containers, preservation, storage, labelling and traceability
- demonstrating correct and safe use, of field instruments and/or equipment under laboratory and field conditions, including field calibration
- identifying and rectifying basic instrument faults
- collecting representative samples in accordance with a sampling plan
- using appropriate techniques to preserve the integrity of samples
- identifying atypical materials and samples and taking appropriate action
- maintaining sampling equipment
- completing sampling records
- seeking advice when issues/problems are beyond scope of competence/responsibility
- working safely for the protection of self and others
- following requirements for the disposal of waste and the preservation of the environment

### Required knowledge

Required knowledge includes:

- appropriate scientific terminology for water chemistry, biology and microbiology
- the 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
- enterprise 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
- enterprise procedures dealing with legislative requirements for the handling, labelling and transport of hazardous goods
- links between correct occupational health and safety (OHS) procedures and personal and environmental safety particularly at high risk sites

## Evidence Guide

Overview of assessment	Competency must be demonstrated in the ability to perform consistently at the required standard.
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>Assessors must be satisfied that the candidate can competently and consistently apply the skills covered in this unit of competency in new and different situations and contexts. Critical aspects of assessment and evidence include:</p> <ul style="list-style-type: none"> <li>• planning and preparing for sample collection</li> <li>• interpreting and correctly applying sampling, testing and data quality procedures</li> <li>• demonstrating correct and safe use of field instruments and/or equipment, including field calibration</li> <li>• obtaining reliable, representative water samples</li> <li>• obtaining valid and reliable field test data</li> <li>• preparing calibration graphs and calculating results using appropriate units and precision</li> <li>• identifying atypical results as out-of-normal range or an artefact</li> <li>• completing sampling records using enterprise procedures</li> </ul>

	<ul style="list-style-type: none"> <li>working safely and follow relevant legislative requirements for the disposal of waste and the preservation of the environment.</li> </ul>
Context of and specific resources for assessment	<p>This unit of competency is to be assessed in the workplace or a simulated workplace environment.</p> <p>Assessment should emphasise a workplace context and procedures found in the candidate's workplace.</p> <p>This unit of competency may be assessed with:</p> <ul style="list-style-type: none"> <li><i>MSS024003A Apply an understanding of environmental principles to site issues</i></li> <li><i>MSL974003A Perform chemical tests and procedures</i></li> <li><i>MSL974007A Undertake environmental field-based monitoring.</i></li> </ul> <p>The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team.</p> <p>Resources may include:</p> <ul style="list-style-type: none"> <li>vehicles, survey equipment, water sampling and monitoring equipment, cameras, consumables and manuals</li> <li>work program, enterprise procedures, codes of practice, maps and field protocols.</li> </ul>
Method of assessment	<p>The following assessment methods are suggested:</p> <ul style="list-style-type: none"> <li>inspection of water samples collected by the candidate</li> <li>review of water sampling and testing records completed by the candidate</li> <li>feedback from peers and supervisors that the candidate consistently follows enterprise procedures, sampling/testing procedures and works safely</li> <li>oral and written questioning to check underpinning knowledge of water sampling and testing procedures, use of equipment and normal ranges</li> <li>review of other workplace documentation completed by the candidate.</li> </ul> <p>In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly.</p> <p>Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and</p>



	<p>disability.</p> <p>The language, literacy and numeracy demands of assessment should not be greater than those required to undertake the unit of competency in a work-like environment.</p>
Guidance information for assessment	

## Range Statement

<b>Codes of practice</b>	Where reference is made to industry codes of practice, and/or Australian/international standards, it is expected the latest version will be used
<b>Legislation, standards, codes, procedures and/or enterprise requirements</b>	<p>Legislation, standards, codes, procedures and/or enterprise requirements may include:</p> <ul style="list-style-type: none"> <li>• federal legislation, such as</li> <li>• Environment Protection and Biodiversity Conservation Act 1999</li> <li>• Australian Heritage Council Act 2003</li> <li>• Native Title Act 1993</li> <li>• state/territory government legislation and regulations and local government by-laws, policies, and plans dealing with: <ul style="list-style-type: none"> <li>• land use, acquisition, planning and protection</li> <li>• environmental protection</li> <li>• cultural/heritage protection</li> <li>• vegetation management</li> <li>• nature conservation and wildlife/plant protection</li> <li>• water and water management</li> <li>• soil conservation</li> <li>• pollution and contaminated sites</li> <li>• fisheries, forestry and mining operations</li> </ul> </li> <li>• Australian and international standards, such as: <ul style="list-style-type: none"> <li>• AS ISO 14050:1999 Environmental management - Vocabulary</li> <li>• AS/NZS ISO 14000 Basic Set:2007 Environmental management basic set</li> <li>• AS/NZS 2031:2001 Selection of containers and preservation of water samples for microbiological analysis</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>• AS 3550 series - Water analysis</li> <li>• AS/NZS 4276 series - Water microbiology</li> <li>• AS/NZS 5667 series - Water quality: sampling</li> <li>• US Environmental Protection Authority (EPA) Methods and guidance for the analysis of water</li> <li>• American Public Health Association (APHA) Standard methods for the examination of waters and wastewaters</li> <li>• ANZECC Guidelines for fresh and marine water quality</li> <li>• Australian guidelines for water quality monitoring and reporting</li> <li>• enterprise sampling and monitoring protocols</li> <li>• equipment manuals and warranties, supplier catalogue and handbooks</li> <li>• government policy (e.g. sustainable development and impact assessment)</li> <li>• occupational health and safety (OHS) national standards and codes of practice</li> <li>• material safety data sheets (MSDS)</li> <li>• site-specific requirements</li> <li>• specific environmental standards</li> </ul>
<p><b>Common field test parameters</b></p>	<p>Common field test parameters may include:</p> <ul style="list-style-type: none"> <li>• pH</li> <li>• electrical conductivity</li> <li>• dissolved oxygen</li> <li>• salinity</li> <li>• temperature</li> <li>• turbidity</li> <li>• Secchi disk depth</li> </ul>
<p><b>Laboratory test parameters</b></p>	<p>Laboratory test parameters (many of which may also be measured in the field) may include:</p> <ul style="list-style-type: none"> <li>• total suspended solids</li> <li>• volatile suspended solids</li> <li>• nitrogen (nitrate, organic, ammonia and Kjeldahl)</li> <li>• phosphorus (total and soluble reactive)</li> <li>• chlorophyll and phaeophytin</li> <li>• total organic carbon (TOC)</li> <li>• biological oxygen demand (BOD)</li> <li>• chemical oxygen demand (COD)</li> <li>• silica</li> <li>• metals (total and dissolved)</li> </ul>

	<ul style="list-style-type: none"> <li>• organic and inorganic pollutants</li> <li>• microorganisms</li> </ul>
<b>Enterprise procedures for field activities</b>	<p>Enterprise procedures for field activities may include:</p> <ul style="list-style-type: none"> <li>• use of field notebooks or log books</li> <li>• standard operating procedures covering fieldwork, sampling and testing</li> <li>• equipment operating manuals, calibration procedures, instrument fault-finding procedures and general maintenance and repair procedures</li> <li>• emergency, first aid and survival procedures</li> <li>• requirements related to protection of the environment</li> <li>• incident/accident/injury report forms</li> </ul>
<b>Equipment</b>	<p>Equipment may include:</p> <ul style="list-style-type: none"> <li>• navigation and communication equipment (e.g. compass, maps, global positioning system (GPS), two-way radio and mobile phone)</li> <li>• survey equipment</li> <li>• sampling equipment and containers, and animal cages</li> <li>• parameter specific meter or multi-probes (e.g. dissolved oxygen, electrical conductivity, pH, turbidity, nitrates, phosphates and temperature)</li> <li>• field test kits to determine such parameters as dissolved gases, chemical anions and cations, heavy metals, E. coli and BOD</li> <li>• portable colorimeters and field microscopes</li> <li>• filters and sieves</li> <li>• soil monitoring kits</li> <li>• data loggers</li> <li>• first aid equipment</li> </ul>
<b>Hazards</b>	<p>Hazards may include:</p> <ul style="list-style-type: none"> <li>• solar radiation, dust and noise</li> <li>• personnel getting lost</li> <li>• accidents, emergencies and incidents, such as snake, insect or animal bites</li> <li>• exposure to severe weather conditions</li> <li>• manual handling of heavy objects</li> <li>• vehicle and boat handling in rough/remote conditions</li> </ul>
<b>OHS and environmental management requirements</b>	<p>OHS and environmental management requirements:</p> <ul style="list-style-type: none"> <li>• all operations must comply with enterprise OHS and environmental management requirements, which may</li> </ul>

	<p>be imposed through state/territory or federal legislation - these requirements must not be compromised at any time</p> <ul style="list-style-type: none"><li>• all operations assume the potentially hazardous nature of samples and require standard precautions to be applied</li><li>• where relevant, users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council (NHMRC) and State and Territory Departments of Health</li></ul>
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## Unit Sector(s)

Environmental

## Custom Content Section

Not applicable.