



**Australian Government**

# **MSS025014 Perform sampling and testing of contaminated sites**

**Release: 2**

# **MSS025014 Perform sampling and testing of contaminated sites**

## **Modification History**

Release 1. Supersedes and is equivalent to MSS025014A Perform sampling and testing of contaminated sites.

Release 2. Prerequisite code updated. Equivalent outcome.

## **Application**

This unit of competency covers the ability to collect samples and conduct field tests/measurements while working safely in a (potentially) hazardous environment. Personnel work under the close supervision of environmental scientists or engineers and use established site health and safety plans and sampling/field testing procedures. They are required to continually monitor levels of risk and use prescribed safe working procedures and safety equipment.

This unit of competency is applicable to environmental technicians in a range of industry sectors, such as environmental services (e.g. sampling and monitoring of air quality, water and soil); environmental compliance, auditing and inspection; management of pollution and contaminated sites; and site remediation or rehabilitation.

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**

|           |                                                   |
|-----------|---------------------------------------------------|
| MSS024020 | Recognise common geological landforms and samples |
|-----------|---------------------------------------------------|

## **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.

- |   |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <b>Assist with preliminary site study</b> | <ul style="list-style-type: none"><li>1.1 Locate and review relevant legislative, regulatory and/or planning requirements and register for contaminated sites.</li><li>1.2 Confirm the site location, scope and purpose of the investigation and assigned tasks with supervisor.</li><li>1.3 Source and review available site data, including site history, geology, hydrogeology and meteorology data.</li><li>1.4 Summarise information to assist with preparation of a site chronology and identification of gaps or inadequacies in data, potential contaminants and areas of possible contamination.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 2 | <b>Prepare for site activities</b>        | <ul style="list-style-type: none"><li>2.1 Confirm the scope and purpose of sampling, testing and/or monitoring activities and data requirements with supervisor.</li><li>2.2 Liaise with site controller to access site, identify locations of services and arrange for induction, clearances and/or permits, as necessary.</li><li>2.3 Review risks posed by site contaminants and review the health and safety plan/safe work procedures specified for planned activities.</li><li>2.4 Confirm the sampling/test methods, sampling/test points, numbers and types of samples and/or measurements with supervisor.</li><li>2.5 Review specified sampling/test methods with close attention to the sequence of steps and details for each.</li><li>2.6 Check the operation/calibration of required sampling equipment, test and/or monitoring instruments in accordance with relevant methods, standards and manufacturer instructions.</li><li>2.7 Ensure all required reagents, solutions and/or calibration standards are obtained and ready for field use.</li><li>2.8 Assemble and safely stow all sampling equipment, test instruments, materials, containers, safety equipment and personal protective equipment (PPE).</li><li>2.9 Arrange suitable transport to, from and around site, as</li></ul> |

required.

- |   |                                                          |     |                                                                                                                                                                  |
|---|----------------------------------------------------------|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3 | <b>Assist with site inspection</b>                       | 3.1 | Sketch, map and/or photograph the site features.                                                                                                                 |
|   |                                                          | 3.2 | Conduct a visual inspection to identify site features that may inform the need for and design of subsequent investigations.                                      |
|   |                                                          | 3.3 | Collect preliminary samples, as directed, to help characterise possible contamination hazards prior to detailed investigations.                                  |
|   |                                                          |     |                                                                                                                                                                  |
| 4 | <b>Conduct sampling as directed</b>                      | 4.1 | Locate sampling/test points and any services at the site.                                                                                                        |
|   |                                                          | 4.2 | Work effectively with other site personnel during drilling excavation and/or survey operations to collect reliable samples, logs and measurements, as necessary. |
|   |                                                          | 4.3 | Follow specified procedures to minimise hazards and/or contamination of samples, self/others, equipment and environment.                                         |
|   |                                                          | 4.4 | Collect and preserve required samples in accordance with sampling plan, relevant methods and/or standards.                                                       |
|   |                                                          | 4.5 | Record all information and label samples in accordance with traceability requirements.                                                                           |
|   |                                                          | 4.6 | Record environmental conditions and/or atypical observations made during sampling that may impact on validity or integrity of samples.                           |
|   |                                                          | 4.7 | Store and transport all samples back to base in accordance with specified method, chain of custody requirements and relevant codes.                              |
|   |                                                          |     |                                                                                                                                                                  |
| 5 | <b>Conduct field tests and/or monitoring as directed</b> | 5.1 | Obtain sample or sub-sample for designated field test.                                                                                                           |
|   |                                                          | 5.2 | Check that all equipment, instruments, reagents and calibration standards are fit for purpose.                                                                   |
|   |                                                          | 5.3 | Set up and calibrate instruments as necessary to ensure safe operation and valid results.                                                                        |

- 5.4 Operate equipment/instruments in accordance with test method requirements.
  - 5.5 Follow specified procedures to minimise hazards and/or contamination of samples, self/others, equipment and environment.
  - 5.6 Perform required measurements and tests on all samples and standards, if appropriate, in accordance with specified methods.
  - 5.7 Keep accurate, complete and traceable records of all field observations and test results.
- 6 **Clean, decontaminate and/or dispose of contaminated equipment and materials**
- 6.1 Inspect equipment to assess the degree of contamination.
  - 6.2 Use specified procedures to remove material from the exposed outer surfaces of sampling/test equipment and PPE.
  - 6.3 Use specified procedures and reagents to neutralise, wash and/or rinse exposed surfaces.
  - 6.4 Collect rinsate blanks for analysis and preserve/store in accordance with specified procedure or standard.
  - 6.5 Stow items for transport only when thoroughly dry.
  - 6.6 Safely collect all debris and sillage from decontamination in accordance with relevant regulations and codes.
- 7 **Finalise site activities**
- 7.1 Arrange for the safe disposal of all hazardous wastes in accordance with relevant regulations and codes.
  - 7.2 Ensure all site observations, sampling/test data and results are accurately transferred to the workplace information management system.
  - 7.3 Store samples in accordance with method, chain of custody requirements and relevant codes, as necessary.
  - 7.4 Ensure samples are dispatched for analytical testing within recommended holding times.

|   |                                         |     |                                                                                                               |
|---|-----------------------------------------|-----|---------------------------------------------------------------------------------------------------------------|
| 8 | <b>Process and interpret data</b>       | 8.1 | Review test/monitoring data noting atypical observations.                                                     |
|   |                                         | 8.2 | Calculate required quantities using relevant test method and ensure values are consistent with expectations.  |
|   |                                         | 8.3 | Estimate and document uncertainty of measurement in accordance with workplace procedures, if required.        |
|   |                                         | 8.4 | Record processed results in accordance with workplace procedures.                                             |
|   |                                         | 8.5 | Interpret trends in data and/or results and report atypical results promptly to appropriate personnel.        |
|   |                                         | 8.6 | Determine if obvious procedure or equipment problems have led to atypical data or results.                    |
|   |                                         | 8.7 | Compare results with established threshold levels or environmental quality concentration limits, if relevant. |
|   |                                         | 8.8 | Finalise reporting of results in accordance with workplace requirement.                                       |
| 9 | <b>Maintain a safe work environment</b> | 9.1 | Clean all equipment, containers, work area and vehicles according to workplace procedures.                    |
|   |                                         | 9.2 | Check serviceability of all equipment before storage.                                                         |
|   |                                         | 9.3 | Use defined safe work practices and PPE to ensure personal safety and that of others.                         |
|   |                                         | 9.4 | Minimise the generation of wastes and environment impacts.                                                    |

## 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
- state/territory government legislation and local government by-laws, policies, regulations and plans dealing with land use, acquisition, planning and protection; environmental protection and impact assessment; and pollution and contaminated sites
- legislation, standards and codes of practice for work health and safety (WHS)
- registration/licensing and/or accreditation requirements
- Australian and international standards covering environmental management (e.g. AS ISO 14050 Environmental management – Vocabulary and AS/NZS ISO 14000 Basic Set:2007 Environmental Management Basic Set); investigation and sampling of sites with potentially contaminated soil (e.g. AS 4482.1-2005 Guide to the investigation and sampling of sites with potentially contaminated soil - Non-volatile and semi-volatile compounds, and AS 4482.2-1999 Guide to the sampling and investigation of potentially contaminated soil - Volatile substances)
- industry guidelines such as: National Environment Protection Measure Assessment of Site Contamination - Schedule B (2) Guideline on data collection, sample design and reporting
- site plans, maps and specifications; methods and procedures for sampling and in-field testing to meet workplace, client and/or regulatory/certifying body requirements; client sampling schemes and sampling plans
- 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.

**Site information includes one or more of:**

- location of site, property details, and current and proposed use
- site history details, such as:
  - site plans, zoning and adjacent land use
  - current and previous present owners, occupiers, users and contaminating uses/activities
  - current and previous buildings and structures

- site industrial processes, raw materials, products, wastes/discharges and waste disposal locations
- product spills/losses, incidents and accidents
- sewer and other utilities/services, plans and previous power sources
- chemical storage and transfer areas
- earth moving activities
- interviews, consultations and complaints.

**Sources of information include one or more of:**

- government departments, such as Environment, Environmental Protection, Conservation, Primary Industry, Water Resources, Lands and Survey, and Planning
- agencies, such as the Bureau of Meteorology and Geoscience Australia
- libraries and environmental data sets
- companies and employees, community representatives and historical societies.

**Visual inspection of the site includes one or more of:**

- current uses of site
- disturbed, coloured or stained soil, and bare soil patches
- disturbed or distressed vegetation
- unusual odour
- quality of surface water and surface water drainage
- condition of buildings, floors and roads
- presence of chemical containers and holding tanks
- presence of fill, containment areas, sumps, drains, landfill, and obvious surface hazards, such as asbestos
- underground structures that may be associated with sub-surface contamination
- condition of materials storage/handling facilities, and solid/liquid waste disposal areas
- evidence of off-site migration, on-site spillage of dangerous goods, and staining/sheens on surface water.

**Scope and purpose of sampling, field tests and/or monitoring include one or more of:**

- determining nature of contamination
- determining concentration and distribution of contamination
- identifying types and concentrations of contaminants for assessing potential exposure levels/risks
- monitoring site conditions to check licence compliance or determine need for remedial action
- rapid analysis of samples that may change between collection

|                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                           | <ul style="list-style-type: none"><li>and analysis</li><li>• rapid sample analysis during remediation activities</li><li>• determining if clean-up has been achieved</li><li>• screening of samples in the field.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Samples include one or more of:</b>                    | <ul style="list-style-type: none"><li>• air, soil gases and dust</li><li>• soils</li><li>• surface water and groundwater</li><li>• radiation</li><li>• replicates, field and trip (transport) blanks, rinsate blanks and background samples.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Field tests and monitoring include one or more of:</b> | <ul style="list-style-type: none"><li>• soil profile measurements and depth of fill</li><li>• measurement of bores and water depth</li><li>• screening of gas/vapours, soil and water samples using:<ul style="list-style-type: none"><li>• colour and texture</li><li>• bioluminescence/toxicity test kits</li><li>• colorimetric methods and dye shake tests</li><li>• pH, electrical conductivity, redox potential, temperature, dissolved oxygen and ammonia concentration</li><li>• photo ionisation detectors (PID)</li><li>• flame ionisation detectors (FID)</li><li>• gas detectors</li><li>• portable infrared analysers for methane and carbon monoxide (CO)</li><li>• portable X-ray fluorescence spectrum analyses</li><li>• field gas chromatography</li><li>• measurement of radiation.</li></ul></li></ul> |
| <b>Safety procedures include one or more of:</b>          | <ul style="list-style-type: none"><li>• preparation/approval of site health and safety plan for sampling/testing, and safe work permits/approvals</li><li>• use of safe work method statements, site safety induction, risk cards, 'step back' and safety checks, SDS, emergency procedures, and reporting procedures for safety problems</li><li>• use of (disposable) PPE such as boots, helmets, gloves, eye and ear protection, overalls, face masks and filters, respirators, encapsulated suits, safety harness and safety torches</li><li>• use of hazardous gas monitors/detectors, personal monitors, environmental monitors and radiation dosimeters, and communication equipment</li><li>• ensuring two persons are present</li></ul>                                                                           |

- working upwind of known contaminants
- prohibition of eating, drinking and smoking
- decontamination facilities, procedures and materials for plant, equipment and personnel
- safe collection and disposal of hazardous waste
- clear access for emergency vehicles
- regular medical checks.

**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 MSS025014A Perform sampling and testing of contaminated sites

## Links

The MSS Sustainability Companion Volume implementation Guides are available from VETNet: -

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

# Assessment Requirements for MSS025014 Perform sampling and testing of contaminated sites

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Release 2. Prerequisite code updated. Equivalent outcome.

## Performance Evidence

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

- conducting at least **one (1)** visual site inspection to identify a site's key features and potential contamination hazards and to inform the design of subsequent investigation(s)
- safely collecting, preserving and labelling a set of samples from at least **one (1)** contaminated site in accordance with a given sampling plan
- safely preparing (sub)samples and conducting at least **two (2)** different tests/analyses in the field using given test methods
- interpreting and applying regulatory and planning requirements for contaminated sites, site sampling/monitoring plans, sampling/test methods, standards and workplace procedures
- recognising hazards and assessing risks; interpreting and applying health and safety plans and safe work methods, including use of designated safety equipment and personal protective equipment (PPE)
- planning for field activities, including researching and summarising site history and chronology, analysing existing data and/or reports, identifying potential contaminants and possible areas of contamination
- preparing for field activities, including arranging site access, induction, permits, conducting reconnaissance, reviewing safety requirements and securing the resources required
- selecting, checking, packaging and transporting supplies, equipment and instruments to and from the field
- collecting reliable samples in accordance with site sampling plan/methods and paying close attention to any pre-treatment, container, preservation, storage, labelling and traceability requirements
- demonstrating correct and safe use of test equipment and/or analysers including set-up, pre-use checks, calibration and performance checks to obtain reliable data
- recognising atypical results as out-of-normal range or an artefact; identifying and rectifying basic instrument faults
- accurately recording site features, environmental conditions and any observations that may impact on reliability of field data
- calculating required quantities using appropriate units, precision, uncertainties and/or calibration graphs

- interpreting gross features/trends in data, identifying atypical results and/or comparing results with established threshold levels or environmental quality concentration limits
- seeking advice when issues/problems are beyond scope of competence/responsibility
- writing/compiling concise and accurate reports in accordance with workplace procedures
- maintaining, cleaning and decontaminating equipment and PPE in accordance with workplace procedures
- working safely and following relevant legislative requirements for the disposal of waste and the preservation of the environment.

## Knowledge Evidence

Must provide evidence that demonstrates knowledge of:

- scientific terminology covering the sampling/testing of air, water and soil at contaminated sites and relevant to job role
- overview of specific legislation, regulations, standards and codes of practice related to contaminated sites, and threshold levels or environmental quality concentration limits for contaminants
- common site hazard and risks, risk assessment techniques and use of risk cards
- properties and health risks associated with groups of contaminants, such as:
  - asbestos
  - heavy metals, such as lead, chromium and arsenic
  - chemical manufacture and industry wastes, such as acids/alkalis, resins, dyes, paints, solvents, fuels, oils, fertilisers, insecticides, herbicides, fungicides, aromatic hydrocarbons, phenols, chlorinated phenols, chlorinated benzenes and organochlorines
- overview of sampling plan design for contaminated sites, including preliminary sampling, non-targeted/grid sampling, targeted/judgemental sampling, and different sampling strategies for gas, water and soil
- sampling/test methods/standards relevant to site activities undertaken
- function of key instrument components and operating principles of common sampling/test equipment relevant to site activities undertaken
- common procedure/equipment problems leading to atypical data/results
- processes for labelling, ensuring chain of custody/traceability of samples and management of large volumes of data
- data processing, recording and reporting procedures
- hazards, health, safety and environment requirements relevant to site activities undertaken; use of safe work methods, safety equipment and PPE.

## 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 contaminated site samples collected by the candidate
  - review of observations, measurements, test results and calculations provided by the candidate
  - review of sampling/test records and site reports prepared by the candidate
  - feedback from supervisors about the candidate's ability to perform sampling and testing of contaminated sites in accordance with given methods and workplace procedures, work safely and produce reliable results within the agreed timeframe
  - oral and/or written questions to assess the candidate's understanding of the principles of sampling/testing of contaminated sites, risk and safety management at contaminated sites, operation of sampling equipment/test instruments/analysers, processing and analysis of data.
- Access is required to all instruments, equipment, materials, workplace documentation, procedures, and specifications associated with this unit including, but not limited to:
  - access to contaminated sites and vehicles
  - appropriate sampling containers, sampling/test equipment, analysers, reagents/consumables, digital camera, global positioning system (GPS), logbooks and data loggers, and/or computers and communication equipment
  - specified PPE, safety equipment and decontamination equipment
  - workplace procedures, work program, maps, site plans, site sampling plans and test methods, standards, environmental data sets, equipment manuals, safety procedures and safe work 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.

## Links

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