



Australian Government

MSS025007 Perform sampling and testing of soils

Release: 1

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Modification History

Release 1. Supersedes and is equivalent to MSS025007A Perform sampling and testing of soils

Application

This unit of competency covers the ability to collect soil samples in accordance with a defined sampling plan, prepare the samples for testing, conduct in-field and laboratory testing of the samples and report the results. Personnel are required to check the validity and reliability of data, recognise atypical test data, and troubleshoot common test procedures and equipment problems.

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

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

MSS024008 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.

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| 1 | Confirm soil sampling and testing requirements with supervisor | 1.1 | Review available site information, such as site plan, sampling/testing locations and history of sampling/testing. |
| | | 1.2 | Confirm the sampling locations, numbers and types of samples, timing and frequency of sampling from workplace or client's sampling plan. |
| | | 1.3 | Check that all sampling/testing procedures are in accordance with client or workplace requirements, relevant standards and guidelines. |
| 2 | Prepare for soil sampling | 2.1 | Identify site and sampling hazards and review workplace safety procedures. |
| | | 2.2 | Liaise with relevant personnel to arrange site access and obtain all clearances and/or permits, as necessary. |
| | | 2.3 | Select sampling equipment and conditions to achieve representative samples and to preserve sample integrity during collection, storage and transit. |
| | | 2.4 | Select field test equipment/instruments and check operation and calibration, as required, in accordance with procedures and manufacturer instructions. |
| | | 2.5 | Assemble and check all sampling equipment, field test equipment, materials, containers and safety equipment. |
| | | 2.6 | Arrange suitable transport to, from and around site, as required. |
| 3 | Conduct sampling and log soil samples | 3.1 | Locate sampling points and any services at the site. |
| | | 3.2 | Work effectively with other site personnel during drilling and excavation operations to collect and log reliable samples, as necessary. |
| | | 3.3 | Conduct representative sampling in accordance with sampling plan and defined procedures for field and/or laboratory testing, as required. |

- 3.4 Record all information and label samples in accordance with traceability requirements.
 - 3.5 Record environment and any conditions or atypical observations made during sampling that may impact on sample representativeness or integrity.
 - 3.6 Transport all samples back to base according to workplace procedures and relevant codes.
- 4 **Prepare soil samples for testing**
 - 4.1 Prepare sub-samples and back-up sub-samples that are representative of the source.
 - 4.2 Label all sub-samples to ensure traceability and store in accordance with workplace procedures.
 - 4.3 Follow defined preparation and safety procedures to limit hazards or contamination to samples, self, work area and environment.
 - 4.4 Distribute sub-samples to required destinations for testing, maintaining sample integrity, traceability and chain of custody requirements.
- 5 **Conduct physical and chemical soil tests in the field**
 - 5.1 Obtain sample or sub-sample for designated field test.
 - 5.2 Check that all equipment, instruments and reagents 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 Perform tests/procedures/observations on all samples and standards, if appropriate, in accordance with specified methods
 - 5.6 Record all field observations and results and ensure that they are accurately transferred to workplace information management system.

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| 6 | Conduct physical and chemical soil tests in the laboratory | 6.1 | Obtain sample or sub-sample for designated laboratory test. |
| | | 6.2 | Check that all equipment, instruments and reagents are fit for purpose. |
| | | 6.3 | Set up and calibrate instruments, as necessary, to ensure safe operation and valid results. |
| | | 6.4 | Operate equipment/instruments in accordance with test method requirements. |
| | | 6.5 | Perform tests/procedures on all samples, blanks and standards, if appropriate, in accordance with specified methods.. |
| | | 6.6 | Record test data noting atypical observations |
| | | 6.7 | Process the data for samples, standards and blanks in accordance with workplace procedures. |
| | | 6.8 | Enter approved information into workplace information management system. |
| 7 | Review results and assess soil suitability for specific purposes | 7.1 | Review results in relation to legislative and/or client requirements. |
| | | 7.2 | Compare data with required/established/desired parameters to establish suitability for purpose. |
| | | 7.3 | Determine need for remedial action and report to client. |
| 8 | Maintain a safe work environment | 8.1 | Rehabilitate sampling site to render it safe and to minimise environmental impact. |
| | | 8.2 | Clean all equipment, containers, work area and vehicles according to workplace procedures. |
| | | 8.3 | Check serviceability of all equipment before storage. |
| | | 8.4 | Use defined safe work practices and personal protective equipment (PPE) to ensure personal safety and that of others. |

- 8.5 Minimise the generation of wastes and environment impacts.
- 8.6 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, acquisition, planning and protection; environmental protection; soil conservation; pollution and contaminated sites
- legislation, standards and codes of practice for work health and safety (WHS)
- Australian and international standards covering: soil sampling (e.g. AS 1199 Sampling procedures for inspection by attributes series, and AS 4433.2-1997 Guide to the sampling of particulate materials - Preparation of samples); soils testing (e.g. HB 160-2006 Soils testing, and AS 1289 Methods of testing soils for engineering purposes series); geotechnical site investigations (e.g. AS 1726-1993 Geotechnical site investigations); and transport of dangerous goods/emergency procedures (AS 1678 Emergency procedure guide series)
- registration/licensing and/or accreditation requirements
- 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.

Materials sampled include one or more of:

- solid samples, such as soil and sediments
- natural, agricultural and engineered soils
- solid wastes
- soil water
- soil gas/vapour.

Types of samples include one or more

- discrete samples
- composite samples

of:

- quality control samples
- research or one-off samples
- environmental or survey samples.

Sampling tools and equipment include one or more of:

- maps, global positioning system (GPS) unit and compass
- shovels and crow bars
- metal-free scoop and cleaning brush
- folding rulers and tape measures
- hand and power augers, pry bars and files (auger maintenance)
- push tubes, sampling tubes, dip tubes, spears and syringes
- front-end loader, backhoe, excavator and drill rig
- sample bottles or containers, plastic bags/containers and disposable buckets
- sample splitters, graters and mills, mortar and pestles
- lysimeters, soil gas probes.

Testing equipment and instruments include one or more of:

- digital camera, hand lenses and microscopes
- sieves and sieve shakers
- Munsell soil colour chart
- pH meter and soil pH test kit
- conductivity meter
- tensiometer (moisture measurements)
- ultraviolet/visible (UV/Vis) spectrophotometer
- atomic absorption spectrophotometer
- gas chromatographs (GC) and GC-MS
- infrared spectrophotometer
- diffuse reflectance accessories
- inductively coupled plasma (ICP) spectrometers and ICP-MS
- X-ray fluorescence (XRF) spectrometers
- radiation monitor (e.g. Geiger-Muller counter).

Site and sampling hazards include one or more of:

- solar radiation, dust and noise
- wildlife such as snakes, spiders and domestic animals
- biohazards such as microorganisms and agents associated with soil
- chemicals such as acids and hydrocarbons
- manual handling of heavy sample bags and containers
- crushing, entanglement and cuts associated with moving machinery and hand tools
- vehicular and pedestrian traffic.

Chemical soil tests include one or more of:

- electrical conductivity
- pH
- alkalinity
- cation exchange capacity
- organic carbon
- available phosphorus
- nutrients and micronutrients
- sulfate
- carbonate
- nitrate and total nitrogen
- metals, including heavy metals
- organics, including pesticides and other hazardous chemicals.

Physical soil tests include one or more of:

- soil profile description
- particle size analysis, soil colour (Munsell), soil texture and water repellence
- infiltration
- soil moisture content
- liquid limit, plastic limit (plasticity index), Atterberg limits, volume expansion and linear shrinkage
- compaction, standard penetration test, cone penetration test
- dispersibility (Emerson class number)
- soil resistivity
- radioactivity.

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

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Links

MSA Training Package Implementation Guides - <http://mskills.org.au/training-packages/info/>