



Australian Government

MSS025009 Perform sampling and testing of air

Release: 1

MSS025009 Perform sampling and testing of air

Modification History

Release 1. Supersedes and is equivalent to MSS025009A Perform sampling and testing of air

Application

This unit of competency covers the ability to collect and test gaseous and particulate components in ambient, indoor and occupational air. Personnel will normally work within an existing sampling or monitoring plan. They will continually monitor levels of risk, apply specified safe working procedures and use prescribed safety equipment.

This unit of competency is applicable to environmental technicians in a range of industry sectors, such as environmental services involved with sampling and monitoring of ambient air, indoor air and occupational air parameters; occupational hygiene; and environmental compliance, auditing and inspection.

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.

1	Confirm air 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 scope and purpose of air sampling/testing and data requirements.

- 1.3 Confirm sampling methods, locations, numbers and types of samples, and duration/frequency of sampling from workplace or client's sampling plan.
 - 1.4 Check that all air sampling/testing procedures are in accordance with client or workplace requirements, relevant standards and guidelines.
- 2 **Prepare for air sampling and testing**
 - 2.1 Identify site and sampling/testing 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 Review field sampling procedures and sample preparation methods required for specific laboratory tests.
 - 2.4 Select sampling equipment and conditions to achieve representative samples and preserve sample integrity during collection, storage and transit.
 - 2.5 Ensure all reagents, solutions, standards and blanks (as appropriate) are obtained and/or ready for field use.
 - 2.6 Select field test equipment/instruments and check operation and calibration, as required, in accordance with procedures and manufacturer instructions.
 - 2.7 Assemble, check, stow all sampling equipment, field test equipment, materials, containers and safety equipment.
 - 2.8 Arrange suitable transport to, from and around site, as required.
- 3 **Conduct sampling of air**
 - 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.
 - 3.3 Ensure all controls, blanks and replicate samples are properly integrated into the sampling process.

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| | | 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 workplace procedures and relevant guidelines. |
| 4 | Conduct field and laboratory testing of air | 4.1 | Take sufficient measurements of all samples and standards, if appropriate, to obtain reliable data. |
| | | 4.2 | Obtain sample or subsample for designated field test or locate established locations for in-situ testing. |
| | | 4.3 | Set up, check/calibrate and operate equipment, instruments, reagents, gases and in accordance with test methods/procedures and manufacturer instructions. |
| | | 4.4 | Perform tests, procedures and any observations in accordance with specified methods/procedures. |
| | | 4.5 | Record all field/laboratory observations and results and ensure that they are accurately transferred to workplace information management system. |
| 5 | Process and interpret air data | 5.1 | Review test data noting atypical observations. |
| | | 5.2 | Ensure calculated values are consistent with expectations. |
| | | 5.3 | Estimate and document uncertainty of measurement in accordance with workplace procedures, if required. |
| | | 5.4 | Record processed results in accordance with workplace procedures. |
| | | 5.5 | Interpret trends in data and/or results and report out-of-specification or atypical results promptly to appropriate personnel. |
| | | 5.6 | Determine if obvious procedure or equipment problems have led to atypical data or results. |

		5.7	Compare results with established air quality standards, statutory environmental quality concentration limits or similar, if relevant.
		5.8	Finalise reporting of results in accordance with workplace requirements.
6	Maintain a safe work environment	6.1	Rehabilitate sampling site to render it safe and to minimise environmental impact.
		6.2	Clean all equipment, containers, work area and vehicles according to workplace procedures.
		6.3	Check serviceability of all equipment before storage.
		6.4	Use defined safe work practices and personal protective equipment (PPE) to ensure personal safety and that of others.
		6.5	Minimise the generation of wastes and environment impacts.
		6.6	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	• 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,
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include the latest version of one or more of:

- acquisition, planning and protection; environmental protection, pollution and contaminated sites
- legislation, standards and codes of practice for work health and safety (WHS)
- Australian and international standards covering: environmental management (e.g. AS ISO 14000 Basic Set:2007 Environmental Management Basic Set series and AS ISO 14050-1999 Environmental management - Vocabulary); sampling and analysis of indoor and ambient air, air quality and air monitoring (e.g. AS 2365 Methods for the sampling and analysis of indoor air series; AS/NZS 3580 Methods for sampling and analysis of ambient air series; AS 2986 series Workplace air quality; and AS 2922 Ambient air series)
- registration/licensing and/or accreditation requirements
- industry guidelines and manuals, such as National Environment Protection Measure (NEPM) (Ambient Air Quality), air quality standards, and statutory environmental quality concentration limits
- site plans, maps and specifications; methods and procedures for air sampling and testing to meet workplace, client and/or regulatory/certifying body requirements
- workplace documents, such as standard operating procedures (SOPs); work schedules; recording and reporting procedures; equipment manuals and warranties; supplier catalogue and handbooks; field notebooks or log books; emergency and safety procedures; safety data sheets (SDS); waste minimisation, containment, processing and safe disposal procedures

Ambient air parameters include one or more of:

- inorganic gases, such as:
 - CO and CO₂, NO_x and SO_x,
 - acidic gases
 - hydrogen sulfide
 - ozone
 - fluorides
- organic gases, such as:
 - methane and non-methane hydrocarbons
 - poly-aromatic hydrocarbons (PAHs)
 - organic oxidants and other photochemical smog compounds, such as poly-aromatic nitrates (PANs)
- air toxics, such as:
 - benzene, toluene and xylenes
 - formaldehyde
 - Benzo(a)pyrene (PAH marker)

- particulates, such as:
 - deposited matter
 - suspended matter (PM₁₀, PM_{2.5} and PM₁)
 - particulate fluorides
 - lead.
- Indoor air parameters include one or more of:**
- inorganic gases, such as:
 - CO and CO₂ and NO_x
 - radon
 - organic gases, such as:
 - formaldehyde
 - poly-aromatic hydrocarbons (PAHs)
 - organic oxidants and other photochemical smog compounds, e.g. poly-aromatic nitrates (PANs)
 - particulates such as:
 - PM10, PM2.5, and PM1
 - microorganisms and spores.
- Occupational (workplace) air parameters include one or more:**
- chemicals listed in the '*Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment*'. Concentration levels for action are:
 - peak
 - short term exposure limit (STEL)
 - time weighted average (TWA).
- Sampling equipment includes one or more of:**
- gas sample bags
 - gas sample bottles/containers
 - gas pipettes
 - gas syringes
 - air sampling pumps
 - sampling manifolds
 - passive diffusion samplers
 - impingers (with absorption solutions)
 - solid adsorbents
 - colour detection tubes
 - coated and uncoated filters
 - sampling trains in continuous gas monitors
 - pitot tubes
 - high volume samplers

- dichotomous samplers
 - gas flow meters.
- Testing equipment includes one or more of:**
- continuous gas monitors:
 - ultraviolet (UV) absorption (e.g. ozone)
 - chemiluminescence (e.g. NO_x)
 - pulsed fluorescence (e.g. SO_x)
 - non-dispersive infrared (e.g. CO)
 - flame ionisation detection (FID) (e.g. methane)
 - photo ionisation detection (PID)
 - integrating nephelometer methodologies (e.g. suspended particulates)
 - oxygen sensors (e.g. zirconia)
 - gas chromatographs
 - mass spectrometers
 - atomic absorption spectrophotometers
 - infrared spectrophotometers
 - UV-visible spectrophotometers
 - tapered element oscillating microbalance (TEOM)
 - beta gauges
 - particle counters
 - portable (handheld) gas monitors.
- Field test equipment includes one or more of:**
- navigation and communication equipment (e.g. compass, maps, GPS, two-way radio and mobile phone)
 - electric generators and power leads
 - calibration gases
 - data loggers
 - first aid equipment.
- 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

Companion Volume implementation guides are found in VETNet -

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

Assessment Requirements for MSS025009 Perform sampling and testing of air

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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:

- collecting, preserving and labelling a set of representative air samples for at least one (1) site in accordance with a given sampling plan
- preparing air (sub)samples and conducting at least two (2) field tests using given test methods
- preparing air (sub)samples and conducting at least two (2) laboratory tests using given test methods
- planning field and laboratory activities
- selecting and checking all required field equipment, test instruments and materials
- using sampling equipment to obtain reliable, representative air samples in accordance with sampling plan and paying close attention to any pre-treatment, containers, preservation, storage, labelling and traceability requirements
- identifying atypical samples and taking appropriate action
- setting-up, calibrating and operating field/laboratory test instruments to obtain valid and reliable data in accordance with test methods
- interpreting gross features of data, identifying atypical results as out-of-normal range or an artefact and making relevant conclusions
- identifying and rectifying basic instrument faults
- calculating results using appropriate units/precision and/or preparing calibration graphs
- using established criteria to make valid conclusions about air quality, if relevant
- providing accurate, complete records of sampling and testing, site observations and data
- presenting and reporting results in accordance with workplace procedures
- seeking advice when issues/problems are beyond scope of competence/responsibility
- safely transporting, cleaning, maintaining and storing field equipment in accordance with workplace procedures
- working safely and following requirements for the disposal of waste and the preservation of the environment.

Knowledge Evidence

Must provide evidence that demonstrates knowledge of:

- scientific terminology used in job role covering atmospheric science, air measurement and air pollution

- structure, circulation and composition of the atmosphere
- atmospheric stability, lapse rates and inversions
- localised meteorology and dispersion of air pollutants
- air pollutants, such as:
 - particulates (e.g. inorganics, organics and metals)
 - inorganic gases (e.g. CO, CO₂, NO_x, SO_x, ammonia, acid rain, halogens and ozone)
 - organic gases (e.g. hydrocarbons, oxygen, halogens, sulphur and nitrogen containing organics)
 - photochemical smog, greenhouse gases and ozone depletion
- principles of air quality sampling and analysis, methods and standards
- function of key components and operating principles of common air quality instruments
- specific legislation, regulations, standards, statutory limits, policies and codes of practice related to air pollution and air quality monitoring
- field sampling and monitoring procedures including labelling, preservation, storage and traceability
- relevant hazards, health, safety and environment requirements, including field safety principles.

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 air samples collected by the candidate
 - review of air quality measurements, test results, calculations and observations and/or reports produced by the candidate
 - review of sampling/testing records completed by the candidate
 - feedback from supervisors about the candidate's ability to apply workplace procedures and air sampling/test methods consistently, work safely and produce results within the agreed timeframe

- oral and/or written questions to check the candidate's understanding of the principles of air quality sampling/testing, operation of air sampling equipment, test instruments and processing of data.
- Access is required to all instruments, equipment, materials, workplace documentation, procedures, and specifications associated with this unit including, but not limited to:
 - vehicles, survey equipment, camera, air sampling/monitoring equipment, field/laboratory test instruments, consumables and manuals
 - work program, workplace procedures, codes of practice, site maps, site monitoring plans and test methods and field protocols.
- 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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