



Australian Government

Department of Education, Employment and Workplace Relations

MSS025009A Perform sampling and testing of air

Release: 1

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Modification History

Not applicable.

Unit Descriptor

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. Note that sampling and testing of odours is covered in MSS025010A Assist with odour source assessment and MSS025011A Assist with odour field assessment.

Application of the Unit

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 workplace air parameters
- occupational hygiene
- environmental compliance, auditing and inspection.
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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 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 enterprise or client's sampling plan |
| | | 1.4 | Check that all air sampling/testing procedures are in accordance with client or enterprise requirements, relevant standards and guidelines |
| 2 | Prepare for air sampling and testing | 2.1 | Identify site and sampling/testing hazards and review enterprise 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
 - 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 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 enterprise information management system

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| 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 enterprise procedures, if required |
| | | 5.4 | Record processed results in accordance with enterprise 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 enterprise 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 enterprise procedures |
| | | 6.3 | Check serviceability of all equipment before storage |
| | | 6.4 | Use defined safe work practices and personal protective equipment 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 |

Required Skills and Knowledge

Required skills

Required skills include:

- planning and preparing for field activities
- observational and descriptive skills
- collecting representative samples in accordance with a sampling plan and method
- using appropriate techniques to preserve the integrity of samples
- demonstrating correct and safe use of field/laboratory instruments and/or equipment, including calibration
- using air quality measurement instrumentation to obtain verifiable, quantitative results
- identifying and rectifying basic instrument faults
- identifying atypical data and samples and taking appropriate action
- maintaining sampling equipment
- completing accurate records of sampling, test data and results
- communicating effectively and writing/compiling concise and accurate reports
- responding effectively to changed or unforeseen circumstances
- seeking advice when issues/problems are beyond scope of competence/responsibility
- following requirements for the disposal of waste and the preservation of the environment
- working safely

Required knowledge

Required knowledge includes:

- appropriate terminology for atmospheric science, air measurement and air pollution
- the 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 (inorganics, organics and metals)
 - inorganic gases (CO, CO₂, NO_x, SO_x, ammonia, acid rain, halogens and ozone)
 - organic gases (hydrocarbons; oxygen, halogens, sulfur 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, policies and codes of practice related to air pollution and air quality monitoring
- field sampling and monitoring procedures, including labelling and traceability

- relevant health, safety and environment requirements, including field safety principles

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"> • demonstrating an understanding of the legislative and regulatory framework relevant to air quality • using air quality measurement terminology accurately • interpreting and applying site air sampling/monitoring plans and procedures • collecting reliable, representative air samples in accordance with methods/procedures • operating, maintaining and calibrating air quality measurement instrumentation to produce consistently valid and accurate results • interpreting gross features of data, identifying atypical results as out-of-normal range or an artefact and making relevant conclusions • calculating results using appropriate units/precision • providing accurate, complete records of sampling and testing observations, data and results • working safely and follow relevant legislative requirements for the disposal of waste and the preservation of the environment.
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"> • <i>MSL974003A Perform chemical tests and procedures</i> • <i>MSL974009A Undertake field-based remote sensing</i> • <i>MSS025016A Perform sampling and testing of</i>

	<p><i>stationary emissions.</i></p> <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"> • vehicles, survey equipment, air sampling/monitoring equipment, cameras, consumables and manuals • work program, enterprise procedures, codes of practice, maps and field protocols.
Method of assessment	<p>The following assessment methods are suggested:</p> <ul style="list-style-type: none"> • inspection of air samples collected by the candidate • review of air quality measurements, test results, calculations and observations produced by the candidate • review of sampling/testing records completed by the candidate • feedback from peers and supervisors about the candidate's ability to consistently apply enterprise procedures and work safely • oral and written questioning 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 • observation of the candidate performing a range of air sampling and testing tasks. <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 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

Codes of practice	<p>Where reference is made to industry codes of practice, and/or Australian/international standards, it is expected the latest version will be used</p>
Legislation, standards, codes, procedures and/or enterprise requirements	<p>Legislation, standards, codes, procedures and/or enterprise requirements may include:</p> <ul style="list-style-type: none"> • federal legislation, such as • Environment Protection and Biodiversity Conservation Act 1999 • state/territory government legislation and regulations and local government by-laws, policies, and plans dealing with: <ul style="list-style-type: none"> • land use, acquisition, planning and protection • environmental protection • pollution and contaminated sites • Australian and international standards, such as: <ul style="list-style-type: none"> • AS ISO 14050:1999 Environmental management - Vocabulary • AS/NZS ISO 14000 Basic set:2007 Environmental management basic set • AS 2365 series Methods for the sampling and analysis of indoor air • AS 2986 series Workplace air quality • AS/NZS 3580 series Methods for sampling and analysis of ambient air • AS/NZS 2922 Guide for the siting of sampling units (air monitoring) • National Environment Protection Measure (NEPM) (Ambient Air Quality) • enterprise sampling and monitoring protocols • equipment manuals and warranties, supplier catalogue and handbooks • government policy (e.g. environmental protection and impact assessment) • material safety data sheets (MSDS) • occupational health and safety (OHS) national standards and codes of practice • site-specific requirements
Ambient air parameters	<p>Ambient air parameters may include:</p> <ul style="list-style-type: none"> • inorganic gases: <ul style="list-style-type: none"> • CO and CO₂ • NO_x

	<ul style="list-style-type: none"> • SO_x • acid gases • hydrogen sulfide • ozone • fluorides • organic gases: <ul style="list-style-type: none"> • methane and non-methane hydrocarbons • poly-aromatic hydrocarbons (PAHs) • organic oxidants and other photochemical smog compounds (e.g. poly-aromatic nitrates (PANs)) • air toxics: <ul style="list-style-type: none"> • benzene, toluene and xylenes • formaldehyde • Benzo(a)pyrene (PAH marker) • particulates: <ul style="list-style-type: none"> • deposited matter • suspended matter (PM₁₀, PM_{2.5} and PM₁) • particulate fluorides • lead
Indoor air parameters	<p>Indoor air parameters may include:</p> <ul style="list-style-type: none"> • inorganic gases, such as: <ul style="list-style-type: none"> • CO and CO₂ • NO_x • radon • organic gases such as: <ul style="list-style-type: none"> • formaldehyde • poly-aromatic hydrocarbons (PAHs) • organic oxidants and other photochemical smog compounds e.g. poly-aromatic nitrates (PANs) • particulates such as: <ul style="list-style-type: none"> • PM₁₀, PM_{2.5}, and PM₁ • microorganisms and spores
Occupational (workplace) air parameters	<p>Occupational (workplace) air parameters may include:</p> <ul style="list-style-type: none"> • chemicals listed in the '<i>Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment</i>'. Concentration levels for action are: <ul style="list-style-type: none"> • peak • short term exposure limit (STEL) • time weighted average (TWA)
Sampling equipment	<p>Sampling equipment may include:</p>

	<ul style="list-style-type: none"> • 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	<p>Testing equipment may include:</p> <ul style="list-style-type: none"> • 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
Enterprise procedures for field activities	<p>Enterprise procedures for field activities may include:</p> <ul style="list-style-type: none"> • field notebooks or log books • standard operating procedures covering fieldwork, sampling and testing • equipment operating manuals, calibration procedures,

	<p>instrument fault-finding procedures and general maintenance and repair procedures</p> <ul style="list-style-type: none"> • emergency, first aid and survival procedures • requirements related to protection of the environment • incident/accident/injury report forms
Additional equipment	<p>Additional equipment may include:</p> <ul style="list-style-type: none"> • 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
Hazards	<p>Hazards may include:</p> <ul style="list-style-type: none"> • solar radiation, dust and noise • exposure to toxic gases • electrical hazards • accidents, emergencies and incidents, such as snake, insect or animal bites • exposure to severe weather conditions • manual handling of heavy objects
OHS and environmental management requirements	<p>OHS and environmental management requirements:</p> <ul style="list-style-type: none"> • all operations must comply with enterprise OHS and environmental management requirements, which may be imposed through state/territory or federal legislation - these requirements must not be compromised at any time • all operations assume the potentially hazardous nature of samples and consumables, and require standard precautions to be applied • 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

Unit Sector(s)

Environmental

Custom Content Section

Not applicable.