Australian Government

Department of Education, Employment and Workplace Relations

# MSL974007A Undertake environmental field-based monitoring

**Revision Number: 1**

# MSL974007A Undertake environmental field-based monitoring

## Modification History

Not applicable.

## Unit Descriptor

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| **Unit descriptor** | This unit of competency covers the ability to organise and undertake field monitoring programs that are primarily focused on the determination of physical and chemical parameters and/or observation and documentation of biological/ecological systems. It covers confirming the requirements of the monitoring activities, sampling, sample handling, physical and chemical monitoring and simple field-based analysis, data collection and recording. It also covers field camp maintenance and field safety. The unit of competency covers gaining clearance for animal trapping, tagging, keeping or experimentation, but does not cover specific animal handling techniques. These tasks would only be performed under the guidance and supervision of a scientific officer. |

## Application of the Unit

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| **Application of the unit** | This unit of competency is applicable to technical, field and environmental officers working in the construction materials, mining and environmental services industry sectors.<br><br>Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section 'This competency in practice'. |

# Licensing/Regulatory Information

Not applicable.

# Pre-Requisites

| **Prerequisite units** | | |
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# Employability Skills Information

| **Employability skills** | This unit contains employability skills. |
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# Elements and Performance Criteria Pre-Content

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| Elements describe the essential outcomes of a unit of competency. | Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide. |

# Elements and Performance Criteria

| ELEMENT | PERFORMANCE CRITERIA |
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| 1. Confirm requirements for field monitoring activities with supervising staff | 1.1. Clarify the purpose, objectives and the defined site for the field monitoring activities<br>1.2. Review all emergency plans, risk assessments, and safety and environmental requirements associated with the field activities<br>1.3. Review and discuss the detailed work program with supervising staff<br>1.4. Clarify the need for permits and any access restrictions or local concerns at field site<br>1.5. Clarify details of all samples to be collected and field parameters to be measured<br>1.6. Confirm final data formats will suit stakeholders who receive or use the data<br>1.7. Review existing in-house protocols and/or associated in-house requirements that relate to field sampling, monitoring and data quality procedures |
| 2. Prepare for field monitoring activities | 2.1. Develop checklists, based on work program, to facilitate correct preparation of field activities<br>2.2. Identify and implement all actions required under enterprise emergency plan, risk assessment, and environment, safety and data quality procedures<br>2.3. Complete all administrative requirements and obtain appropriate approvals/permits<br>2.4. Prepare and check all instruments, equipment, materials and supplies required to implement field program<br>2.5. Confirm, correct and safe use of equipment and details of field activities with supervisor<br>2.6. Arrange and check correct operation, packaging and transportation of all supplies and equipment<br>2.7. Arrange all additional pre- and post-monitoring activities |
| 3. Perform field activities | 3.1. Establish and maintain field camp in accordance with enterprise procedures, as necessary<br>3.2. Perform field sampling, monitoring, data collection and recording as per the agreed work program<br>3.3. Label all samples and complete data sheets and field log book in accordance with enterprise procedures<br>3.4. Store samples/specimens in accordance with any special requirements for continued wellbeing, |

| ELEMENT | PERFORMANCE CRITERIA |
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| | viability or integrity<br>3.5. Perform all tests and operate all equipment according to enterprise instructions<br>3.6. Store and maintain equipment and, where appropriate, calibrate instruments during field activities<br>3.7. Perform all activities safely with minimal impact on the environment |
| 4. Close down field monitoring activities | 4.1. Arrange and check final packaging and transportation of all samples, equipment and supplies back to home base<br>4.2. Ensure that monitoring/camp site is left in accordance with enterprise and environmental requirements<br>4.3. Ensure all samples and data are stored safely<br>4.4. Ensure dispatch of collected samples for subsequent analysis<br>4.5. Test and, if required, decontaminate equipment before storage<br>4.6. Report results/noting any anomalies with users, data analysers and/or supervisor |

# Required Skills and Knowledge

**REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit.

**Required skills**

Required skills include:

- field sampling and monitoring procedures, including labelling and traceability
- demonstrating correct and safe use, under laboratory and field conditions, of field instruments and/or equipment (including field calibration)
- identifying and rectifyingbasic instrument faults
- collecting and preserving plants and animals to enable subsequent identification
- operating communication systems
- operating transportation systems
- applying data quality procedures under field conditions
- locating and managing of monitoring sites
- communicating effectively and efficiently
- reviewingand documenting emergency, safety or environmental field plans
- developing checklists covering instruments, equipment and associated supplies
- maintaining, storing and transporting samples/specimens to ensure their wellbeing, viability and integrity
- working safely for the protection of self and others
- negotiating with staff and stakeholders and reaching satisfactory agreements, where possible
- responding effectively to changed or unforeseen circumstances

**Required knowledge**

Required knowledge includes:

- purpose and the objectives of a field activity, including:
  - information and analysis required
  - end users of information
  - significance of outcomes for broader programs
- risk assessment principles
- technical capabilities and limitations of common equipment and instruments
- specific legislation and codes of practice related to sample and animal collection
- a range of chemical and physical field monitoring procedures
- enterprise procedures for the recording of field data
- relevant health, safety and environment requirements, including field safety/survival principles

# Evidence Guide

| EVIDENCE GUIDE | |
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| The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package. | |
| **Overview of assessment** | |
| **Critical aspects for assessment and evidence required to demonstrate competency in this unit** | Assessors should ensure that candidates can:<br>• demonstrate understanding of the purpose and objectives of a field activity, including:<br>  • information and analysis required<br>  • end users of information<br>  • significance of outcomes for broader programs<br>• communicate effectively and efficiently with staff and other relevant parties<br>• review a written work program and define the major field activities<br>• review emergency, safety or environmental field plans and document the key aspects which relate to a defined field activity<br>• develop accurate and complete checklists covering instruments, equipment and associated supplies necessary for a defined field activity<br>• apply sampling, testing and data quality procedures accurately under field conditions<br>• prepare, check and calibrate field instruments<br>• demonstrate correct and safe use, under laboratory and field conditions, of field instruments and/or equipment (including field calibration)<br>• define and correctly prepare sample containers for different field samples<br>• take samples, under field conditions, according to defined procedures<br>• maintain, store and transport samples/specimens to ensure their wellbeing, viability and integrity<br>• pack and transport supplies, equipment and instruments to and/or from a field site<br>• accurately perform field tests according to written instructions<br>• record data and information, conduct quality checks and field analysis<br>• work safely for the protection of self and others |

| EVIDENCE GUIDE | |
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| | • negotiate with staff and stakeholders and reach satisfactory agreements, where possible<br>• respond effectively to changed or unforseen circumstances. |
| **Context of and specific resources for assessment** | This unit of competency is to be assessed in the workplace or simulated workplace environment.<br>This unit of competency may be assessed with:<br>• *MSL945001A Maintain laboratory/field workplace safety*<br>• *MSL954001A Obtain representative samples in accordance with sampling plan*.<br>Resources may include:<br>• vehicles, survey equipment, sampling/monitoring equipment, consumables and manuals<br>• work program, enterprise procedures, codes of practice and field protocols. |
| **Method of assessment** | The following assessment methods are suggested:<br>• review of field data and results obtained by the candidate<br>• feedback from supervisors and peers<br>• demonstration of understanding of existing work program requirements by:<br>  • developing a checklist of the resources required to carry out a defined work program<br>  • developing a list of all pre-and post-monitoring requirements<br>• observation of fieldwork performed by candidate with a focus on:<br>  • sample collection, preservation, storage and transportation<br>  • field sampling and monitoring procedures<br>  • accurate data recording<br>  • safety, emergency and environmental aspects of monitoring activity<br>  • communication techniques<br>  • general site reconnaissance<br>• response to simulation exercises with a focus on:<br>  • accident and emergency situations<br>  • basic environmental impact assessment of a field |

| EVIDENCE GUIDE | |
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| | site<br>• loss of communication system and implementation of alternative procedures<br>• demonstration of calibration, use and general maintenance of field instruments and equipment<br>• oral and/or written questions to assess underpinning knowledge.<br><br>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.<br><br>Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability.<br><br>Access must be provided to appropriate learning and/or assessment support when required.<br><br>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. |
| **This competency in practice** | Industry representatives have provided the case studies below to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting.<br><br>**Environmental (1)**<br><br>A technical officer in an environmental protection authority is required to undertake an emergency monitoring program in a small catchment following a public complaint that a small industrial site has illegally discharged a concentrated sodium chloride/acid mixture into a nearby creek system. The monitoring program requires three samples to be taken above and three samples below the industrial site over a distance of two kilometres. Additional tests covering electrical conductivity, pH, temperature and turbidity are to be done in situ at the same time as when the samples are taken. All samples and monitoring procedures are to be clearly documented and undertaken according to statutory and enterprise requirements, as the results may potentially be required to be presented and cross-examined in court. All of the above planning, |

| EVIDENCE GUIDE | |
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| | implementation and reporting must be completed within 24 hours.<br><br>**Environmental (2)**<br><br>A technical officer is involved in a four day lake survey 100 km from the laboratory. The survey is designed to collect many water samples and undertake netting activity to determine the variety and food requirements of fish in the lake. The technical officer is responsible for collecting the water samples, in accordance with the predetermined sampling plan and enterprise sampling procedures, and disposing of the fish samples after they have undergone field-based gut analysis. Given the large number of water samples and the duration of the field trip, the technical officer arranges for the hire of several 3-way camping refrigerators (gas/12V/240V) to store and transport the water samples at 4°C and for appropriate supervised burial of the fish samples at a local council landfill. In addition, he/she prepares, checks and packs all the supplies and equipment.<br><br>**Environmental (3)**<br><br>In preparation for a major field trip to collect soil samples in a remote location, a technical officer spent several weeks ensuring that all arrangements were in place. The officer confirmed access to the site and located suitable maps, aerial photos and reconnaissance data. The logistics of food, water, hygiene, fuel, transport, communications and safety were planned with senior staff to suit the fieldwork location, duration and personnel involved. The vehicles were serviced in preparation for remote off-road work and a full complement of spares was assembled. All supplies and field equipment were purchased or assembled, checked against an inventory and securely stowed in the vehicles. |

# Range Statement

| **RANGE STATEMENT** | |
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| The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included. | |
| **Codes of practice** | Where reference is made to industry codes of practice, and/or Australian/international standards, it is expected the latest version will be used |
| **Standards**, **codes**, **procedures and/or enterprise requirements** | Standards, codes, procedures and/or enterprise requirements may include:<br>• Australian and international standards such as:<br>  • AS 1678 Emergency procedure guide - Transport<br>  • AS 1940-2004 Storage and handling of flammable and combustible liquids<br>  • AS 3780-2008 The storage and handling of corrosive substances<br>  • AS 4332-2004 The storage and handling of gases in cylinders<br>  • AS ISO 17025-2005 General requirements for the competence of testing and calibration laboratories<br>• AS/NZS 2243 Set:2006 Safety in laboratories set<br>  • AS/NZS 2865 Set:2005 Safe working in a confined space set<br>  • AS/NZS 4452:1997 The storage and handling of toxic substances<br>• AS/NZS 4501 Set:2008 Occupational clothing set<br>  • AS/NZS ISO 14000 Set:2005 Environmental management standards set<br>  • HB 9-1994 Occupational personal protection<br>• animal welfare legislation and codes of practice<br>• Australian code of good manufacturing practice for medicinal products (GMP) |

| **RANGE STATEMENT** | |
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| | • Australian Dangerous Goods Code<br>• Australian Quarantine and Inspection Service (AQIS) Export Control (Orders) Regulations 1982<br>• Australian Quarantine and Inspection Service (AQIS) Import Guidelines<br>• Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) Codes of Practice<br>• data quality procedures<br>• enterprise sampling and monitoring protocols<br>• equipment manuals and warranties, supplier catalogue and handbooks<br>• gene technology regulations<br>• government policy (e.g. sustainable development and impact assessment)<br>• Guide to physical containment levels and facility types<br>• material safety data sheets (MSDS)<br>• national environment protection measures<br>• National Health and Medical Research Council (NHMRC) Guidelines<br>• national measurement regulations and guidelines<br>• occupational health and safety national standards and codes of practice<br>• principles of good laboratory practice (GLP)<br>• site specific requirements<br>• specific environmental standards<br>• Therapeutic Goods Regulations 1009 |
| **Communications** | Communications may include:<br>• face-to-face<br>• telephone<br>• written documents<br>• meetings |
| **Purpose of field monitoring activities** | Purpose of field monitoring activities may include:<br>• single or multiple site sampling and monitoring<br>• routine monitoring of physical/chemical parameters<br>• biological/ecological surveys<br>• requirement to comply with legislation, |

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| | regulations or standards<br>• requirement to comply with industry sampling or monitoring protocols or codes of practice |
| **Related plans and procedures** | Related plans and procedures may include:<br>• risk assessments<br>• safety and accident/injury plans<br>• emergency plans and procedures, access to nearest medical services<br>• environmental impact assessment procedures<br>• pollution prevention procedures<br>• first aid and survival procedures |
| **Hazards** | Hazards may include:<br>• solar radiation, dust and noise<br>• personnel getting lost<br>• accidents, emergencies and incidents, such as snake, insect or animal bites<br>• exposure to severe weather conditions<br>• manual handling of heavy objects<br>• power tools, generators, moving machinery<br>• vehicle and boat handling in rough/remote conditions |
| **Safety procedures and control measures** | Safety procedures and control measures may include:<br>• use of personal protective equipment, such as sunscreen, hats, safety glasses, gloves, coveralls and safety boots<br>• 'stay with vehicle' and other survival techniques<br>• regular communication schedule<br>• global positioning system (GPS), maps and aerial photos<br>• handling, storage and disposal of all hazardous materials/waste in accordance with MSDS, labels, enterprise procedures, codes and regulations |
| **Enterprise procedures for field activities** | Enterprise procedures for field activities may include:<br>• field note books or log books<br>• standard operating procedures (SOPs) covering |

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| | fieldwork, sampling and testing<br>• equipment operating manuals, calibration procedures, instrument fault finding procedures and general maintenance and repair procedures<br>• emergency, first aid and survival procedures<br>• field camp procedures for cleaning, cooking, safety, security, hygiene, work management and set up/take down<br>• requirements related to protection of the environment<br>• incident/accident/injury report forms |
| **Administrative requirements and appropriate approvals** | Administrative requirements and appropriate approvals may include:<br>• travel requisitions<br>• authority for use of vehicles and equipment<br>• insurance<br>• permits |
| **Equipment** | Equipment may include:<br>• navigation and communication equipment (e.g. compass, maps, GPS, two-way radio and mobile phone)<br>• survey equipment<br>• sampling equipment and containers, and animal cages<br>• parameter specific meter or multi-probes (e.g. dissolved oxygen, electrical conductivity, pH, turbidity, nitrates, phosphates and temperature)<br>• field test kits to determine such parameters as dissolved gases, chemical anions and cations, heavy metals, E. coli and biological oxygen demand<br>• portable colourimeters, field microscopes<br>• filters, sieves<br>• soil monitoring kits<br>• data loggers<br>• tools, spares and vehicle recovery equipment<br>• first aid equipment |
| **Pre- and post-field activities** | Pre- and post-field activities may include:<br>• review of emergency and safety plans, risk |

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| | assessment and environmental assessment requirements<br>• confirming information regarding location and contact numbers of nearest emergency services<br>• arranging site access (e.g. maps, permission, keys and condition of tracks)<br>• arranging and checking all transportation systems (e.g. vehicles, boats and aircraft)<br>• checking that communication systems are available and operational<br>• confirming correct and safe use of instruments, equipment and field procedures with supervisor<br>• confirming location and details of sampling sites (e.g. maps, photographs and descriptions)<br>• preparing sample containers (e.g. container type and preparation, preservation techniques and labelling)<br>• arranging correct transport, storage and laboratory testing of samples collected during field activities<br>• arranging additional laboratory testing |
| **Field monitoring activities and skills** | Field monitoring activities and skills may include:<br>• sample collection, preservation, labelling, storage, and transportation according to written procedures<br>• correct use and calibration of field instruments according to written instructions<br>• correct and accurate performance of field tests for specific parameters<br>• clear and accurate recording of data<br>• safe operation of motor vehicles and boats |
| **Management of field camp activities** | Management of field camp activities may include:<br>• purchase of supplies<br>• booking of accommodation<br>• assembly, checking and transport of equipment/consumables, such as tents, cooking, bedding, communication system, food, water<br>• mechanical checks of all transport vehicles<br>• rostering and supervision of staff |

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| | • location, establishment, and maintenance of site, including hygiene and waste<br>• removal of waste and site remediation |
| **Site and field issues and problems** | Site and field issues and problems may include:<br>• loss or failure of equipment<br>• failure to bring critical equipment<br>• communication failure/difficulties<br>• unexpected restriction access to site<br>• unforseen environmental impacts<br>• contact with hazardous wastes |
| **Occupational health and safety (OHS) and environmental management requirements** | OHS and environmental management requirements:<br>• 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<br>• all operations assume the potentially hazardous nature of samples and require standard precautions to be applied<br>• 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)

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| **Unit sector** | Testing |

# Competency field

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| **Competency field** | |

# Co-requisite units

| Co-requisite units | | |
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