



Australian Government

MSL975025 Perform complex laboratory testing of forensic samples

Release: 1

MSL975025 Perform complex laboratory testing of forensic samples

Modification History

Release 1. Supersedes and is equivalent to MSL975025A Perform complex laboratory testing of forensic samples

Application

This unit of competency covers the ability to perform complex laboratory testing of samples that may be used as forensic evidence. Competency includes the ability to establish client needs for routine and non-routine forensic samples, select suitable techniques and methods and modify them if required, obtain valid and reliable data, and report test results. Personnel are required to recognise atypical test data/results, troubleshoot common analytical procedure and equipment problems and ensure all testing and reporting meets judicial requirements.

This unit of competency is applicable to technical officers working in all industry sectors and government agencies, such as food, forensic, medical and environmental laboratories. The term forensic is used to describe tests which may have legal implications, such as those used to verify claims for insurance companies.

Complex forensic laboratory tests are non-routine and may require the development of new or modified methods. They require a high degree of analytical skill and knowledge, or practical experience required to perform the analysis and interpret the results. Complex forensic tests include all forms of comparative, evaluative, analytical and optical (visual) methods and techniques. They can be performed on specialised analytical instruments and include tests such as DNA profiling, gunshot residue analysis using scanning electron microscopy energy dispersive X-ray spectroscopy (SEM-EDX), identification of accelerant residue samples from arson attacks using gas chromatography mass spectroscopy (GC-MS), and explosive residue analysis.

All operations and analytical methods must comply with relevant standards, appropriate procedures and/or workplace requirements. Although a supervisor may not always be present, the technical officer will follow standard operating procedures (SOPs) that clearly describe the scope of permitted practice, including modifying workplace/test procedures and communicating results to people outside the laboratory.

While no specific licensing or certification requirements apply to this unit at the time of publication, laboratory operations are governed by relevant legislation, regulations and/or external accreditation requirements. Local requirements should be checked.

Pre-requisite Unit

Nil

Competency Field

Testing

Unit Sector

Elements and Performance Criteria

Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.												
1 Establish client needs and schedule analysis	<table><tr><td>1.1</td><td>Obtain evidential material/samples following accepted chain of custody procedures</td></tr><tr><td>1.2</td><td>Record sample description, compare with specification and record and report discrepancies</td></tr><tr><td>1.3</td><td>Evaluate samples and select appropriate laboratory procedure from accepted standard forensic techniques and validated scientific methods</td></tr><tr><td>1.4</td><td>Identify the possible need to modify workplace techniques or methods, for example, to ensure recovery of sample materials</td></tr><tr><td>1.5</td><td>Seek advice from supervisor about any proposed variations and document all approved changes according to workplace quality system and judicial requirements</td></tr><tr><td>1.6</td><td>Schedule analysis using workplace procedures</td></tr></table>	1.1	Obtain evidential material/samples following accepted chain of custody procedures	1.2	Record sample description, compare with specification and record and report discrepancies	1.3	Evaluate samples and select appropriate laboratory procedure from accepted standard forensic techniques and validated scientific methods	1.4	Identify the possible need to modify workplace techniques or methods, for example, to ensure recovery of sample materials	1.5	Seek advice from supervisor about any proposed variations and document all approved changes according to workplace quality system and judicial requirements	1.6	Schedule analysis using workplace procedures
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2 Prepare samples and standards	<table><tr><td>2.1</td><td>Obtain a representative analytical portion of the sample</td></tr><tr><td>2.2</td><td>Prepare sample in accordance with testing requirements</td></tr><tr><td>2.3</td><td>Prepare validation checks and/or calibration standards for analytical portions</td></tr></table>	2.1	Obtain a representative analytical portion of the sample	2.2	Prepare sample in accordance with testing requirements	2.3	Prepare validation checks and/or calibration standards for analytical portions						
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3 Perform analysis	<table><tr><td>3.1</td><td>Perform laboratory examination in accordance with validated technique or method on standards, validation checks and samples</td></tr><tr><td>3.2</td><td>Conduct sufficient testing to obtain reliable data</td></tr><tr><td>3.3</td><td>Perform tests according to workplace requirements for timeframe and cost</td></tr><tr><td>3.4</td><td>Troubleshoot technique or method problems which have led to atypical data or results</td></tr></table>	3.1	Perform laboratory examination in accordance with validated technique or method on standards, validation checks and samples	3.2	Conduct sufficient testing to obtain reliable data	3.3	Perform tests according to workplace requirements for timeframe and cost	3.4	Troubleshoot technique or method problems which have led to atypical data or results				
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| 4 | Process and analyse data | <div>4.1 Confirm data is the result of valid measurements</div> <div>4.2 Perform any required calculations and ensure results are consistent with standards or estimations and expectations</div> <div>4.3 Record results with the appropriate accuracy, precision, uncertainty and units</div> <div>4.4 Draw conclusions from examination of results according to accepted forensic practices and documented requirements</div> <div>4.5 Review laboratory methodology and test results</div> |
| 5 | Maintain a safe work environment | <div>5.1 Identify risks, hazards, safety equipment and control measures associated with sample handling, preparation and analytical method</div> <div>5.2 Use personal protective equipment (PPE) and safety procedures specified for test method and materials to be tested</div> <div>5.3 Minimise the generation of waste and environmental impacts</div> <div>5.4 Ensure the safe disposal of laboratory waste</div> <div>5.5 Clean, care for and store equipment and consumables in accordance with workplace procedures</div> |
| 6 | Maintain laboratory records and report results | <div>6.1 Enter approved data and results into laboratory information management system (LIMS) according to workplace quality system and judicial requirements</div> <div>6.2 Maintain equipment logs in accordance with workplace procedures</div> <div>6.3 Maintain security, integrity and traceability of samples and documentation</div> <div>6.4 Prepare reports for presentation of evidence and communicate results to appropriate personnel</div> |

Foundation Skills

This section describes those language, literacy, numeracy and employment skills 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.

Standards, codes, procedures and/or workplace requirements

Standards, codes, procedures and/or workplace requirements include the latest version of one or more of:

- Australian and international standards covering the requirements for the competence of testing and calibration laboratories, laboratory design and construction, physical containment levels and facility types, laboratory safety, and quality and environmental management
- national work health and safety (WHS) standards and codes of practice, and national measurement regulations and guidelines
- Australian and international standards and guidelines covering specialised chemical analysis, accuracy of measurement methods and results, expression of uncertainty and quantifying uncertainty
- specific codes, guidelines, procedures and methods, such as the Australian code of good manufacturing practice for medicinal products (GMP), and principles of good laboratory practice (GLP)
- workplace documents, such as judicial protocols; SOPs; quality and equipment manuals; data quality procedures; calibration and maintenance schedules; material safety data sheets (MSDS) and safety procedures; material and product specifications; laboratory schedules; workplace recording and reporting procedures; waste minimisation and safe disposal procedures; cleaning, hygiene and personal hygiene requirements; stock records and inventory
- forensic sampling procedures (labelling, preparation, storage, transport and disposal)
- test procedures (validated and authorised)

Complex testing on forensic samples

Complex testing includes, but is not limited to, one or more of the following techniques and methods:

- infrared and ultraviolet/visible (UV/Vis) spectrometric techniques, such as inductively coupled plasma optical emission spectroscopy (ICP-OES), inductively coupled plasma mass spectroscopy (ICP-MS), X-ray fluorescence (XRF) and neutron activation analysis (NAA)
- chromatographic techniques, such as gas chromatography mass spectroscopy (GC-MS), ion chromatography (IC) and high pressure liquid chromatography (HPLC)
- electrometric techniques, such as ion selective electrodes, voltammetry (polarography) and anodic stripping voltammetry
- electrophoretic techniques, such as capillary electrophoresis
- electrometric methods, such as anodic stripping voltammetry
- molecular techniques, such as DNA profiling and polymerase chain reaction
- scanning electron microscopy

Validation checks and/or calibration standards

Validation checks and/or calibration standards include, but are not limited to, one or more of:

- positive and known positive controls
- negative controls, such as substrate blanks
- recovery check controls
- certified reference materials

Reviewing laboratory methodology and test results

Reviewing laboratory methodology and test results includes, but is not limited to, one or more of:

- assessing the methodology for appropriate application to evidence
- assessing the chain of custody and sample handling to ensure integrity
- assessing testing procedures for compliance with quality system and judicial requirements
- evaluating interpretation of test results for validity

Safety procedures

Safety procedures include, but are not limited to, one or more of:

- ensuring access to service shut-off points
- recognising and observing hazard warnings and safety signs
- labelling of samples, reagents, aliquoted samples and hazardous materials
- handling and storage of hazardous materials and equipment in accordance with labelling, MSDS and manufacturer instructions
- identifying and reporting operating problems or equipment

malfunctions

- cleaning and decontaminating equipment and work areas regularly using workplace procedures
- using PPE, such as gloves, safety glasses, coveralls and gowns
- use of fume hoods, direct extraction of vapours and gases
- use of appropriate equipment, such as biohazard containers, laminar flow cabinets, Class I, II and III biohazard cabinets
- minimising exposure to radiation ionising such as lasers, electromagnetic and UV radiation
- reporting abnormal emissions, discharges and airborne contaminants, such as noise, light, solids, liquids, water/wastewater, gases, smoke, vapour, fumes, odour and particulates, to appropriate personnel

WHS and environmental management requirements

WHS and environmental management requirements include:

- complying with WHS and environmental management requirements at all times, which may be imposed through state/territory or federal legislation. These requirements must not be compromised at any time
- applying standard precautions relating to the potentially hazardous nature of samples
- accessing and applying current industry understanding of infection control issued by the National Health and Medical Research Council (NHMRC) and State and Territory Departments of Health, where relevant

Unit Mapping Information

Release 1. Supersedes and is equivalent to MSL975025A Perform complex laboratory testing of forensic samples

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=5c63a03b-4a6b-4ae5-9560-1e3c5f462baa>

Assessment Requirements for MSL975025 Perform complex laboratory testing of forensic samples

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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:

- safely performing complex laboratory testing of forensic samples to produce valid and reliable results on at least three (3) occasions
- establishing client needs for routine and non-routine forensic samples
- completing chain of custody forms according to judicial and workplace requirements
- prioritising the evaluation of items of evidence to ensure sample integrity is maintained
- selecting suitable techniques and methods and modifying them if required
- sequencing and selecting forensic sample techniques and methods to maximise recovery of sample materials
- performing complex laboratory examinations in accordance with validated technique or method on standards, validation checks and samples
- applying theoretical knowledge and deductive processes to draw conclusions from test results
- recognising atypical test data and results
- communicating any problems to a supervisor or industry professional using current and appropriate terminology
- troubleshooting common analytical procedure and equipment problems
- ensuring all testing and reporting meets judicial requirements
- maintaining security, integrity and traceability of forensic samples, evidence, sub-samples, test data, results and documentation
- reporting results of forensic examinations and tests according to judicial and workplace protocols
- following workplace safety procedures.

Knowledge Evidence

Must provide evidence that demonstrates knowledge of:

- terminology and principles of locating, recording, collecting, storing, transporting, testing and reporting forensic samples and evidence
- legal, regulatory, policy, procedural and quality system requirements for the collection, preservation, security, continuity and disposal of forensic samples and evidence (exhibits)
- principles and concepts related to testing techniques and methods

- potential limitations of own specialist knowledge and when to seek advice from other services
- peer services available to assist laboratory examination, testing and interpretation of forensic samples
- review processes for examination of test findings
- relevant hazards, work health and safety (WHS) and environment requirements.

Assessment Conditions

- Judgment 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).
- This unit of competency may be assessed with:
 - MSL977003 Contribute to the validation of test methods
 - MSL975024 Locate, record and collect forensic samples
- Holistic assessment methods include:
 - review of test data, results and reports obtained by the candidate over a period of time to check accuracy, consistency and timeliness of results
 - review of workplace documentation and reports completed by the candidate
 - feedback from clients, peers, supervisors and/or industry professionals about the candidate's ability to conduct complex laboratory testing of forensic samples to produce valid and reliable results
 - observation of candidate testing a range of forensic samples and evidence
 - oral or written questioning of relevant chemical principles and concepts, analytical techniques, forensic protocols and workplace procedures.
- Access is required to instruments, equipment, materials, workplace documentation, procedures and specifications associated with this unit, including, but not limited to:
 - a standard laboratory with specialised analytical instruments, laboratory reagents and equipment, standard operating procedures (SOPs) and test 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 competence 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 a laboratory about performing the competency being assessed within the last twelve months.

Links

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<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=5c63a03b-4a6b-4ae5-9560-1e3c5f462baa>