



Australian Government

MSL975025A Perform complex laboratory testing of forensic samples

Release 1

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Modification History

New unit

Unit Descriptor

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.

Application of the Unit

This unit of competency is applicable to technical officers working in all industry sectors and government agency laboratories, for example, in food, forensic, medical and environmental laboratories. The term forensic is used to describe tests which may have legal implications, for example, testing 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 enterprise 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 enterprise/test procedures and communicating results to people outside the laboratory.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Not applicable.

Employability Skills Information

This unit contains employability skills

Elements and Performance Criteria Pre-Content

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

1	Establish client needs and schedule analysis	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 enterprise 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 enterprise quality system and judicial requirements
		1.6	Schedule analysis using enterprise procedures
2	Prepare samples and standards	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 | 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 enterprise requirements for timeframe and cost |
| | | 3.4 | Troubleshoot technique or method problems which have led to atypical data or results |
| 4 | Process and analyse data | 4.1 | Confirm data is the result of valid measurements |
| | | 4.2 | Perform any required calculations and ensure results are consistent with standards or estimations and expectations |
| | | 4.3 | Record results with the appropriate accuracy, precision, uncertainty and units |
| | | 4.4 | Draw conclusions from examination of results according to accepted forensic practices and documented requirements |
| | | 4.5 | Review laboratory methodology and test results |
| 5 | Maintain a safe work environment | 5.1 | Identify risks, hazards, safety equipment and control measures associated with sample handling, preparation and analytical method |
| | | 5.2 | Use personal protective equipment and safety procedures specified for test method and materials to be tested |
| | | 5.3 | Minimise the generation of wastes and environmental impacts |
| | | 5.4 | Ensure the safe disposal of laboratory wastes |
| | | 5.5 | Clean, care for and store equipment and consumables in accordance with enterprise procedures |

- 6 Maintain laboratory records and report results**
- 6.1 Enter approved data and results into laboratory information management system (LIMS) according to enterprise quality system and judicial requirements
 - 6.2 Maintain equipment logs in accordance with enterprise procedures
 - 6.3 Maintain security, integrity and traceability of samples and documentation
 - 6.4 Prepare reports for presentation of evidence and communicate results to appropriate personnel

Required Skills and Knowledge

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

Required skills include:

- establishing client needs for routine and non-routine samples
- completing chain of custody forms according to judicial and enterprise requirements
- prioritising the evaluation of items of evidence to ensure sample integrity is maintained
- communicating with supervisors and industry professionals using current and appropriate terminology
- maintaining integrity and security of all items of evidence/samples
- using problem solving/research skills, for example, in troubleshooting equipment problems
- applying theoretical knowledge and deductive processes to draw conclusions from test results

Required knowledge includes:

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

Evidence Guide

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.

<p>Critical aspects for assessment and evidence required to demonstrate competency in this unit</p>	<p>Assessors should ensure that candidates can:</p> <ul style="list-style-type: none"> • interpret client request, and select and perform test methods to the standard required in judicial procedures • sequence and select forensic sample techniques and methods to maximise recovery of sample materials • interpret and draw conclusions from complex forensic testing results • communicate any problems to a supervisor or industry professional using current and appropriate terminology • maintain security, integrity and traceability of forensic samples/evidence, sub-samples, test data/results and documentation • report results of forensic examinations and tests according to judicial and enterprise protocols.
<p>Context of and specific resources for assessment</p>	<ul style="list-style-type: none"> • This unit of competency is to be assessed in the workplace or simulated workplace environment. • This unit of competency may be assessed with: <ul style="list-style-type: none"> • MSL977003A Contribute to the validation of test methods • MSL975024A Locate, record and collect forensic samples • Resources may include: <ul style="list-style-type: none"> • standard laboratory with analytical instruments • laboratory reagents and equipment • enterprise procedures and standard methods.
<p>Method of assessment</p>	<ul style="list-style-type: none"> • The following assessment methods are suggested: <ul style="list-style-type: none"> • review of test data/results/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 • observation of candidate testing a range of forensic samples/evidence • feedback from clients, peers, supervisors and industry professionals • oral or written questioning of required knowledge. • In all cases, practical assessment should be supported by questions to assess required knowledge and those aspects of competency

	<p>which are difficult to assess directly.</p> <ul style="list-style-type: none">• Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability.• Access must be provided to appropriate learning and/or assessment support when required.• The language, literacy and numeracy demands of assessment should not be greater than those required to undertake the unit of competency in a work place environment.
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Range Statement

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.

<p>Codes of practice</p>	<p>Where reference is made to industry codes of practice, and/or Australian/international standards, it is expected that the latest version be used</p>
<p>Standards, codes, procedures and/or enterprise requirements</p>	<p>Standards, codes, procedures and/or enterprise requirements may include:</p> <ul style="list-style-type: none"> • Australian and international standards, such as: <ul style="list-style-type: none"> • AS ISO 1000-1998 The international system of units (SI) and its application • AS ISO 17025-2005 General requirements for the competence of testing and calibration laboratories • AS/NZS 2243 Set:2006 Safety in laboratories set • AS/NZS ISO 9000 Set:2008 Quality management systems set • AS 2830.1-1985 Good laboratory practice – Chemical analysis • AS 2162.1-1996 Verification and use of volumetric apparatus – General – Volumetric glassware • AS 2134.1-1999 Recommended practice for chemical analysis by atomic absorption spectrometry – Flame atomic absorption spectrometry • ISO/IEC Guide 98-3:2008 Uncertainty of measurement – Part 3 Guide to the expression of uncertainty in measurement (GUM) • Eurachem/CITAC Guide CG4 Quantifying uncertainty in analytical measurement • calibration and maintenance schedules • cleaning, hygiene and personal hygiene requirements • data quality procedures • enterprise procedures, SOPs and operating manuals

	<ul style="list-style-type: none">• enterprise recording and reporting procedures• equipment startup, operation and shutdown procedures• forensic sampling procedures (labelling, preparation, storage, transport, storage and disposal)• incident and accident/injury reports• judicial and enterprise protocols• material safety data sheets (MSDS)• national measurement regulations and guidelines• principles of good laboratory practice (GLP)• production and laboratory schedules• quality manuals, equipment and procedure manuals• quality system and continued improvement processes• safety requirements for equipment, materials or products• schematics, work flows and laboratory layouts• statutory and enterprise work health and safety (WHS) requirements• stock records and inventory• test procedures (validated and authorised)• training program contents• waste minimisation, containment, processing and disposal procedures
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<p>Complex testing on forensic samples</p>	<p>Complex testing may include techniques and methods such as:</p> <ul style="list-style-type: none"> • infra-red 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 and (XRF) 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
<p>Validation checks and/or calibration standards</p>	<p>Validation checks and/or calibration standards may include:</p> <ul style="list-style-type: none"> • positive and known positive controls • negative controls, such as substrate blanks • recovery check controls • certified reference materials
<p>Reviewing laboratory methodology and test results</p>	<p>Reviewing laboratory methodology and test results may include:</p> <ul style="list-style-type: none"> • 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
<p>Hazards</p>	<p>Hazards may include:</p> <ul style="list-style-type: none"> • electric shock • biohazards: <ul style="list-style-type: none"> • microbiological organisms and agents associated with soil, air, water, blood and

	<p>blood products, and human or animal tissue and fluids</p> <ul style="list-style-type: none"> • mycotoxins • chemicals: <ul style="list-style-type: none"> • acids (e.g. sulphuric, perchloric and hydrofluoric) • heavy metals and pesticides • anions (e.g. fluoride) • hydrocarbons (e.g. mono-aromatics) • radiation (alpha, beta, gamma, X-ray and neutron) • sharps and broken glassware • aerosols from broken centrifuge tubes and pipetting • flammable liquids and gases • cryogenics, such as dry ice and liquid nitrogen • fluids under pressure, such as hydrogen in gas liquid chromatography and acetylene in atomic absorption spectrometry • sources of ignition • high temperature ashing processes • disturbance or interruption of services
Hazard control measures	<p>Hazard control measures may include:</p> <ul style="list-style-type: none"> • use of MSDS • labelling of samples, reagents, aliquoted samples and hazardous materials • personal protective equipment, such as gloves, safety glasses, and coveralls • use of fumehoods, direct extraction of vapours and gases • use of appropriate equipment, such as biohazard containers, laminar flow cabinets, Class I, II and III biohazard cabinets • handling and storage of all hazardous materials and equipment in accordance with labelling, MSDS and manufacturer instructions • minimising exposure to radiation ionising such as lasers, electromagnetic and UV radiation
WHS and environmental management requirements	<p>WHS and environmental management requirements:</p> <ul style="list-style-type: none"> • all operations must comply with enterprise WHS and environmental management requirements, which may be imposed through state/territory or federal legislation – these requirements must not

	<p>be compromised at any time</p> <ul style="list-style-type: none">• all operations assume the potentially hazardous nature of samples 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
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Unit Sector(s)

Not applicable.

Custom Content Section

Not applicable.